



*Association of Systematic
Biologists of the Philippines*



Wildlife
Conservation
Society of the
Philippines

FORGING
PARTNERSHIPS
FOR
UNDERSTANDING
AND
CONSERVING
BIODIVERSITY

23RD PHILIPPINE
BIODIVERSITY
SYMPOSIUM

University of San Carlos
Talamban, Cebu City
April 1-4, 2014





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PHILIPPINE
ENVIRONMENT

Fostering Partnerships for the Environment

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23rd Annual Philippine Biodiversity Symposium

organized by the Wildlife Conservation Society of the Philippines (WCSP)
and the Association of Systematic Biologists of the Philippines (ASBP)
at the University of San Carlos (USC), Talamban, Cebu City

1-4 April 2014

**Theme: Forging Partnerships for
Understanding and Conserving Philippine Biodiversity**

ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES

Association of Systematic Biologists of the Philippines

Established in 1982, the Association of Systematic Biologists of the Philippines (ASBP) aims to promote and represent the science and practice of taxonomy, systematics and natural history in the country. Initially formed by a core group of Filipino biologists and researchers based in the National Museum, its membership has grown to encompass professionals, students and enthusiasts all over the Philippines and abroad. Its scope has expanded in recent years outside of the traditional sphere of basic taxonomy and systematics to include ethnobiology, biodiversity conservation and public education. Membership in the ASBP is open to all who subscribe to the goals of the organization.

The **Wildlife Conservation Society of the Philippines (WCSP)** is a professional organization of wildlife researchers, managers, scientists, and conservationists. The Society was formed to advance wildlife research and conservation in the Philippines through promoting collaborative research, providing technical assistance and training and increasing public awareness. Since 1992, wildlife biologists and conservationists from throughout the country have been meeting at the **WCSP Annual Biodiversity Symposia** and the proceedings from most of these annual meetings have been published. The WCSP was officially registered in 1993.

The **WCSP Annual Philippine Biodiversity Symposia** are generally held in April at different venues around the Philippines. Symposium activities include an institutional fair where organizations involved in biodiversity research and conservation can present posters, plenary and keynote addresses, concurrent workshops, and contributed oral and poster presentations including special sessions for high school and undergraduate students.

Symposia of the Wildlife Conservation Society of the Philippines

- 1992 Dumaguete, Negros Oriental
- 1993 Los Banos, Laguna
- 1994 Initao, Misamis Oriental
- 1995 Quezon City, Metro Manila
- 1996 Dumaguete, Negros Oriental
- 1997 Los Banos, Laguna
- 1998 Davao City
- 1999 Puerto Princesa, Palawan
- 2000 Tagaytay, Cavite
- 2001 Dumaguete, Negros Oriental
- 2002 Cebu
- 2003 Murcia, Negros Occidental
- 2004 Antipolo, Rizal
- 2005 Tuguegarao, Cagayan Valley
- 2006 Puerto Princesa, Palawan
- 2007 Davao City
- 2008 Baybay, Leyte
- 2009 Baguio, Benguet
- 2010 Naga, Camarines Sur
- 2011 Dumaguete, Negros Oriental
- 2012 Manila and Dasmariñas Cities
- 2013 Musuan, Bukidnon
- 2014 Talamban, Cebu City

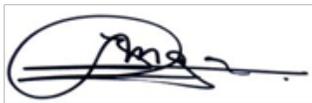
Proceedings of the Wildlife Conservation Society of the Philippines

- Silliman Journal 1992, vol. 36, no. 1
- Asia Life Sciences 1993, vol. 2, no. 2
- Sylvatrop 1995, Vol. 5, nos. hh1 & 2
- Sylvatrop 1997, Vol. 7, nos. 1 & 2
- Sylvatrop 1998, Vol. 8, nos. 1 & 2
- Sylvatrop 2000, Vol. 10, nos. 1 & 2
- Silliman Journal 2001, vol. 42, no. 1
- Sylvatrop 2003, Vol. 13, nos. 1 & 2
- Agham Mindanaw 2004, vol. 2
- Sylvatrop 2005, Vol. 15, nos. 1 & 2
- Banwa Natural Science 2006, Vol. 3, nos. 1 & 2
- Banwa Natural Science 2007, Vol. 4, no. 2

I take this occasion to warmly greet and welcome everyone to the 23rd Philippine Biodiversity Symposium held at the sprawling campus of the University of San Carlos in Cebu City. Our event promises to be the biggest gathering this year of academics, researchers, policymakers and stakeholders concerned with the extremely rich yet critically threatened flora and fauna of the Philippines. Nowhere is the cry of our threatened biodiversity loudest and most serious than on the island of Cebu which has reputedly lost almost all of its primary forests to the forces of modernization. The threats continue to this day because of the unabated degradation of critical life-supporting ecosystems both in the terrestrial and aquatic realms in the often misguided pursuit of economic development and urbanization. Sadly, the same scenario can be seen in many parts of the Philippines where elements of the rich and indigenous biodiversity cling to the edge of imminent extinction.

Our conference therefore rises to the occasion by rallying many concerned parties from all walks of life, from the portals of the academe, the active think tanks among policy-makers and NGOs and the workers on the ground to jointly explore and discuss viable solutions to the mounting challenges before us. We are bound by our common desire to know, understand, protect and conserve our rich biodiversity which forms an integral part of the Filipino natural heritage and which to a large part defines our Filipino national identity. What biological heritage in its current sorry state that we have inherited from our forefathers, we must appreciate and nurture in a sustainable way to pass along someday to the next generations of Filipinos as part of an intangible legacy that only a well-informed and caring Filipino nation can do to its future citizens. Our generation will be held accountable by those who follow our path and will be judged by history for our actions. We hope that our conference will serve to remind us of this and other important consequences.

Allow me to commend the Wildlife Conservation Society of the Philippines and the Association of Systematic Biologists of the Philippines for pooling their efforts and resources with great resolve to jointly organize this year's Philippine Biodiversity Symposium. Nowhere is the conference theme on forging partnerships in understanding and conserving Philippine biodiversity ringing loud and true than in this unprecedented coming together of the Philippines' two biggest biodiversity societies. We hope that this joint conference becomes a springboard of sustainable success that will bring us closer to our goals of knowing and protecting the natural heritage in our corner of the world.



LUISITO T. EVANGELISTA, Ph.D.
President
Association of Systematic Biologists of the Philippines

The theme of this Philippine Biodiversity Symposium, “Forging Partnerships for Biodiversity Research and Conservation”, is for me the primary mission of the Wildlife Conservation Society of the Philippines. The Wildlife Conservation Society of the Philippines (WCSP) and the Association of Systematic Biologists of the Philippines (ASBP) have been forging partnerships through co-organizing this symposium. With the substantial overlap in the objectives of both organizations we are very pleased for this opportunity to work together.

The symposium is hosted by the University of San Carlos, the institutional home of a diverse team of biodiversity researchers. The island of Cebu, renowned for its endemic species, is centrally located in the Philippines, and we have participants from all over the country. Furthermore, our symposium is graced by two highly respected international colleagues who have been working to further our understanding and the conservation of Philippine biodiversity, Dr. Peter Ng of the National University of Singapore and Dr. Thomas Brooks of the International Union for the Conservation of Nature. They, and our other international participants, demonstrate that our partnerships for biodiversity research and conservation are not limited to the country’s geographic boundaries – the conservation of Philippine biodiversity is a global priority.

Contributed papers, both oral and poster, comprise the bulk of the four-day symposium. We salute the authors of the ____ submitted abstracts for oral and poster presentations. They and their work are indications of the importance of forging partnerships for biodiversity research and conservation – so we can better learn from and work with fellow biodiversity researchers and conservationists. The task of screening the abstracts was challenging, especially as even with concurrent sessions hard decisions had to be made. To ensure fairness and consistency in the decisions on which abstracts to accept for oral presentations, each abstract was reviewed by at least two reviewers with familiarity with the topic concerned; final decisions were made by the Abstract Review Committee, with members from both ASBP and WCSP.

This year marks the birth of the Biodiversity Conservation Society of the Philippines. The Wildlife Conservation Society of the Philippines was born at the first Philippine Biodiversity Symposium in 1992 and officially registered in 1993. Almost all of the founding members (I am proud to have been one of them!) were terrestrial vertebrate biologists, and “Wildlife Conservation Society of the Philippines” was a natural choice. Since then, the members of the WCSP have broadened their interests to all terrestrial biodiversity (including freshwater), and marine mammals and marine turtles. (Other organizations are already doing a very good job of covering our rich Philippine marine biodiversity.)

The WCSP board felt that “biodiversity” more accurately represents the collective focus of our work and passion. The term was coined in 1985 as a contraction of “biological diversity” and has become widely used worldwide and in the Philippines. “Biological diversity” means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (Article 2 of the Convention on Biological Diversity). The Biodiversity Conservation Society of the Philippines is technically a new organization, but it contains over two decades of collective experience of the Wildlife Conservation Society of the Philippines working for Philippine biodiversity conservation.



NINA R. INGLE, PhD

President

Wildlife Conservation Society of the Philippines

Biodiversity Conservation Society of the Philippines

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PROGRAM

23rd Annual Philippine Biodiversity Symposium
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 at the **University of San Carlos (USC), Talamban, Cebu City**
1-4 April 2014

**Theme: *Forging Partnerships for
 Understanding and Conserving Philippine Biodiversity***

<p>1 April 2014 Tuesday 9:00 am–1:30 pm CAFA Lobby</p> <p>11:00–12:00 noon Learning Resource Center, Main Library 1:30–3:00 pm CAFA Main Theater</p> <p>3:00–3:30</p> <p>3:30–4:00</p> <p>4:00–4:30</p> <p>4:30–6:00 CAFA Lobby 5:30–6:00 Secretariat Office 6:00–8:00 CAFA Lobby</p> <p>2 April 2014 Wednesday 8:00–8:40 outside CAFA Main Theater CAFA Main Theater 8:40–8:50 am</p>	<p>Symposium Registration Set-up of poster presentations, submission of PowerPoint presentations, sign-up for workshops</p> <p>Exhibit Opening: Biodiversity in the Visayas</p> <p align="center">Opening Program Emcee: Dr. Roberto C. Pagulayan</p> <p>Invocation</p> <p>National Anthem</p> <p>Welcome to the Philippine Biodiversity Symposium, Dr. Luisito T. Evangelista, <i>President, Association of Systematic Biologists of the Philippines</i></p> <p>Recognition of Represented Organizations: Dr. Nina R. Ingle, <i>President, Wildlife Conservation Society of the Philippines</i></p> <p>Welcome to the University of San Carlos</p> <p>Inspirational Message: Dr. Isabelo R. Montejo, <i>Regional Executive Director, Department of Environment and Natural Resources, Region VII</i></p> <p>Inspirational Message: Dr. Theresa Mundita Lim, <i>Director, Biodiversity Management Bureau</i></p> <p>Coffee Break</p> <p>Biodiversity Research at the University of San Carlos: <i>Dr. Filipina B. Sotto, Head, USC Marine Station, Department of Biology, University of San Carlos</i></p> <p>Getting to Know Fellow Systematists and Biodiversity Researchers and Conservationists – Dr. Edwin R. Tadosa and Mr. Apolinario B. Cariño</p> <p>Opening of Institutional Posters</p> <p>Briefing for All Presenters and Moderators – Dr. Rey Donne S. Papa and Mr. Carlo Custodio</p> <p>Welcome Dinner</p> <p>Registration</p> <p>Emcee: <i>Dr. Arvin C. Diesmos</i></p> <p>Raffle and Announcements</p>
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8:50-9:00	The Association of Systematic Biologists of the Philippines, Dr. Luisito T. Evangelista
9:00-9:40	Keynote Address: Southeast Asia Biodiversity Research: Redux?, Dr. Peter K. L. Ng, Raffles Museum of Biodiversity Research, National University of Singapore
9:40-10:00	Open Forum
10:00-10:30	Snack Break

Concurrent Scientific Paper Presentations

	CAFA Main Theater	CAFA Mini-Theater
	Session 1: Student Presentations	Session 2
	Moderator: <i>Dr. Lawrence M. Liao</i>	Moderator: <i>Dr. Melanie Medecilo</i>
10:30-10:45	<p>Contiguous forest cover or broken woodland: testing models of residential development vis-a-vis bird diversity in Antipolo, Taytay, Rizal <i>Aira Trisha G. Dy Guaso, Timothy Stephen D. Blas, Paula Erika B. Capanas, Angelo Miguel R. Gemzon, Kevin Clinton D.C. Sorilla and Yo Han Sung</i></p>	<p>Evidence for a novel natural <i>Begonia</i> hybrid from Panay Island, the Philippines <i>Rosario R. Rubite, Jelene V. Macabasco, Arlene D. Talaña, Grecebio Jonathan D. Alejandro, Ching-I Peng, Koh Nakamura and Yoshiko Kono</i></p>
10:45-11:00	<p>Re-introduction of <i>Awaous melanocephalus</i> Bleeker, 1849 (Biang Bato) in three Antipolo streams experiencing graded anthropogenic disturbance <i>Marina Nicole G. Salvador, Paulina Danice A. Cedro, Ana Rafaella U. Aligaen, Vincent Paul W. Valera Jr., Nikko Maurice C. Nackaerts, Edward Vincent C. De Leon and Young Jun Eom</i></p>	<p><i>Amorphophallus adamsensis</i>, an addition to the Philippine flora <i>Liezel M. Magtoto, Deemson G. Mones, Karen A. Ballada, Celia M. Austria, Romeo M. Dizon, Wilfredo V. Alangui, Aris A. Reginaldo, Wilen M. Galvan, Kathleen T. Dizon and Wilbert L.A. Hettterscheid</i></p>
11:00-11:15	<p>Species limits and biogeography of Philippine Malkohas (<i>Cuculiformes:Cuculidae</i>) from Luzon Islands and Palawan Faunal Regions <i>Estephen B. Fortela and Juan Carlos T. Gonzalez</i></p>	<p>Inventory, assessment and conservation of selected threatened, endemic, rare and economic species of seed plants in Mindanao <i>Victor B. Amoroso, Hannah P. Lumista, Reggie Y. Dela Cruz and Florfe M. Acma</i></p>

PROGRAM

11:15-11:30	<p>Habitat use and foraging behavior of Golden Yellow White-eye (<i>Zosterops nigrorum catarmanensis</i>) in Camiguin Island, Northern Mindanao <i>Kimberly Ma. R. Mendoza</i>, Dennis A. Warguez, Lisa Marie J. Paguntalan and Philip Godfrey C. Jakosalem</p>	<p>Exploring ex situ conservation of <i>Aglaomorpha cornucopia</i> (Copel.) M.C. Roos: A rare and endemic fern from the Philippines Yao-Moan Huang, Victor B. Amoroso, Kathleen Grace S. Paraguas, Fulgent Coritico and <i>Wen-Liang Chiou</i></p>
11:30-11:45	<p>Diversity and diurnal roosting preferences of cave-dwelling bats in Barangay Plazan and Lower Itil, Balabagan, Lanao del Sur, Philippines <i>Johaimen M. Maca-alang</i>, Bradley Bob V. Dela Calzada, Dennis A. Warguez and Daisy Lou L. Polestico</p>	<p>Diversity and characterization of epiphytic macrolichens of Caliking, Atok, Benguet <i>Mechell P. Lardizaval</i>, Leo Carlexter Sison, Froi Perez, Kjeldsen Mae Dumlao, Yolanda Falingao, Marianthe Saquing and Paulina A. Bawingan</p>
11:45-12:00	<p>Microhabitat of the Philippine Tarsier, <i>Tarsius syrichta</i> (Linn. 1758) in a semi-captive environment in Corella, Bohol, Philippines <i>Quennie Ann Uy</i>, Therese Elaine B. Enad, Noel D. Roble, and Julie B. Otadoy</p>	<p>Vascular plants of the peat swamp forest in Caimpugan, Agusan del Sur Province on Mindanao Island, Philippines <i>Lowell G. Aribal</i>, and Edwino S. Fernando</p>
12:00-1:30 pm	<p>Concurrent Scientific Paper Presentations</p>	
1:30-1:45	<p style="text-align: center;">CAFA Main Theater</p> <p>Session 3: Student Presentations Moderator: <i>Dr. Lawrence M. Liao</i></p> <p>Diversity, distribution, and habitat association of amphibian fauna of Bunawan, Agusan del Sur with implications for conservation of forest-associated threatened and endemic taxa <i>Jaymar M. Falcasantos</i> and Adam Roy V. Galolo</p>	<p style="text-align: center;">CAFA Mini-Theater</p> <p>Session 4 Moderator: <i>Mr. John Rey Callado</i></p> <p>A survey of plants used as repellents against hematophagous insects by the Ayta people of Pampanga province, Philippines <i>Jasper John A. Obico</i> and Elena M. Ragraquio</p>

1:45-2:00	<p>Comparison of the diversity of ground-dwelling ants in a forested area and a coconut plantation in Bacon-Manito, Bicol, Philippines <i>Felipe L. Del Castillo</i>, Ma. Dolores C. Tongco and David M. General</p>	<p>Soil-vegetation interrelationships of tree species in a lowland forest in the Puerto Princesa Subterranean River national park <i>Ralph Sedricke Lapuz</i>, Rodel Barairo, Jr. and Marcelle Louise Aquino</p>
2:00-2:15	<p>Spider diversity in the Owl's Nest area in the University of the Philippines, Diliman <i>Kevin John A. Verona</i>, Ma. Dolores C. Tongco, and Aimee Lyn Barrion-Dupo</p>	<p>Fungal flora of Batanes Group of Islands: a lesser known group of organism in the Philippines <i>Edwin R. Tadiosa</i>, Maya M. Beronque, Kathrine K. Balderas, Susan S. Cataluna and Roger Hubayan</p>
2:15-2:30	<p>Macrophyte distribution in the littoral zones of Lake Taal <i>Anna Patricia V. Gerong</i>, Patricia D. Orellana, Chrio A. Sta. Ana, George Louis P. Caballes, Kenoses L. Legaspi, Jonathan Carlo A. Briones and Rey Donne S. Papa</p>	<p>Diversity and biomass potential of microalgae in estuary and fresh water ecosystems <i>Lothy Fernandez-Casim</i>, Bryan Lloyd P. Bretaña and Alexter F. Generale</p>
2:30-2:45		<p>The effects of anthropogenic land use on the distribution of butterflies in Negros Oriental, Philippines <i>Jade Aster T. Badon</i></p>
2:45-4:00	<p>Opening of Scientific Posters Pecha Kucha - brief presentations for high school and undergraduate poster presenters Moderators: <i>Ms. Lisa Paguntalan and Dr. Pauline A. Bawingan</i> Viewing of Scientific Posters (refreshments available)</p>	
4:00-6:00	<p>Emcee: <i>Dr. Neil Adrin D. Mallari</i> Raffle and Announcements</p>	
CAFA Lobby 3 April 2014	<p>The Wildlife Conservation Society of the Philippines and the Biodiversity Conservation Society of the Philippines, Dr. Nina R. Ingle <i>Keynote Address: Guiding Decisions with Biodiversity Knowledge, Dr. Thomas Brooks, Science and Knowledge Unit, International Union for Conservation of Nature (IUCN)</i></p>	
Thursday	<p>Open Forum Snack Break Group Picture Taking</p>	
CAFA Main Theater	<p>Annual General Meeting (Association of Systematic Biologists of the Philippines) Poster Viewing (for non-ASBP members)</p>	
8:40-8:50 am		
8:50-9:00		
9:00-9:40		
9:40-10:00		
10:00-10:45		
Front of CAFA Building		
10:45-12:00		

PROGRAM

12:30-1:30 pm	Lunch	
	Concurrent Scientific Paper Presentations	
	CAFA Main Theater	CAFA Mini-Theater
	Session 5	Session 6
1:30-1:45	Moderator: <i>Ms. Myrissa Lepiten-Tabao</i> Small is beautiful: conservation partnership for rural development with Indigenous peoples in Mindanao <i>Jayson Ibanez</i>	Moderator: <i>Ms. Renee Lorica</i> The Isabela Oriole conservation: saving our golden treasure <i>Joni T. Acay, Nikki Dyanne C. Realubit, Myrna C. Cureg, Antonia M. Bagunu and Merlijn van Weerd</i>
1:45-2:00	Using local attitudes and social values for selecting Key Conservation Areas in Mount Hamiguitan Range <i>Rai Kristie Salve Gomez, Jayson Ibañez, Tatiana Rose Abaño, Anna Leah Pilayre, Shari Campano and Dennis Salvador</i>	From subspecies to species, applying the Tobias criteria on Philippine birds <i>Juan Carlos T. Gonzalez</i>
2:00-2:15	The biodiversity partnerships project: mainstreaming biodiversity conservation through national agencies, conservation groups and local government units' collaboration initiatives <i>Jose M. Regunay, Ben-Hur R. Vilorio and Theresa Mundita S. Lim</i>	Survey of Philippine Eagles and their nests in the Northern Cordillera Range in Apayao Province <i>Tatiana Rose C. Abaño and Jayson C. Ibañez</i>
2:15-2:30	Enhancing the adaptive capacity of the indigenous peoples by promoting sustainable and community-based resin tapping of Almaciga (<i>Agathis philippinensis</i> Warb.) in selected certificate of ancestral domain title (CADT) areas in Palawan and Sierra Madre <i>Florena B. Samiano and Arsenio B. Ella</i>	Conservation status of Philippine Eagles in Leyte: what we currently know <i>Giovanna Tampus, Jayson Ibanez, Dennis Salvador and Kathleen Aballe</i>
2:30-2:45	Notable threatened trees and its potential as seed source for restoring the lowland rainforest of Central Panay Mountain Range <i>Ruth C. Martinez</i>	The diversity and conservation of birds and bats of Calanasan, Apayao, northern Cordillera, Luzon, Philippines <i>Merlijn van Weerd, Dominic Rodriguez, Marites Balbas, Joni Acay, Jan van der Ploeg, Arnold Macadangdang and Edmund Jose</i>

2:45-3:00	<p>Lessons learned in the implementation of forest restoration efforts in the Philippines: The Haribon Foundation experience <i>Thaddeus Martinez</i> and Miel Loria</p>	<p>Three new species of <i>Musseromys</i>: why does it matter? <i>Lawrence R. Heaney</i>, Danilo S. Balete, Eric A. Rickart, Maria Josefa Veluz, and Sharon A. Jansa</p>
3:00-3:30	Snack Break	
3:30-6:00	Annual General Meeting (Biodiversity Conservation Society of the Philippines) Poster Viewing (for non-WCSP/BSCP members)	
6:00-8:00	Fellowship Banquet Awarding for Student Presentations Announcement of Winners of the Silent Auction	
4 April 2014 Friday 8:25-8:30 am	Raffle and Announcements	
	Concurrent Scientific Paper Presentations	
	CAFA Main Theater	CAFA Mini-Theater
	Session 7	Session 8
	Moderator: <i>Dr. Leticia Afuang</i>	Moderator: <i>Dr. Tammy Mildenstein</i>
9:00-9:15	<p>Crocodiles enhance local fishery productivity: two examples from the Philippines <i>Abner A. Bucol</i>, Rainier I. Manalo, Angel C. Alcala, Paulina S. Aspillia, Vicente P. Mercado, William T. Belo and Salvador S. Chan</p>	<p>Cave bats of Pisan, Kabacan, Cotabato, Philippines with notes on the local threats and disturbance and its implication to conservation <i>Krizler C. Tanalgo</i>, Marion John Michael M. Achondo and John Aries G. Tabora</p>
9:15-9:30	<p>Conservation genetics and trade forensics of Philippine sailfin lizards <i>Cameron D. Siler</i>, Rafe M. Brown and Andres Lira</p>	<p>Bat flies (Diptera: Nycteribiidae) from selected localities: extending the bat fly distribution in the Philippines <i>James DV. Alvarez</i>, Ireneo L. Lit, Jr., and Phillip A. Alviola</p>
9:30-9:45	<p>Detection and occupancy of anurans from forest fragments in Cavite, Luzon Island, Philippines <i>Rubie M. Causaren</i>, Arvin C. Diesmos and Neil Aldrin D. Mallari</p>	<p>Filipinos for flying foxes: engaging local stakeholders in flying fox conservation in northeast Luzon <i>Marites Balbas</i>, Edmund Jose, Tammy Mildenstein and Merlijn van Weerd</p>

1:00-4:00 pm	<p>Afternoon Symposium and Workshops (to be held concurrently at different venues) Moderator: <i>Mr. Carlo Custodio</i></p>
AF-101	<p>Challenges and Issues Facing Natural History Collections and Museums Facilitators: <i>Lawrence M. Liao, Hiroshima University and Luisito T. Evangelista, National Museum of the Philippines</i></p>
AF-102	<p>Reinventing the Wheel of Environmental Education Facilitators: <i>Henry G. Calilung, Marina Nicole G. Salvador, Aira Trisha G. Dy Guaso and Ria Rochelle M. Garcia, Holistic Education and Development Center</i></p>
AF-103	<p>Would the Proposed New Standards for Identification of Key Biodiversity Areas Be Fit For Purpose in the Philippines? Facilitators: <i>Thomas Brooks, International Union for Conservation of Nature (IUCN). Shiela Vergara, ASEAN Center for Biodiversity and Nina R. Ingle, Wildlife Conservation Society of the Philippines</i></p>
AF-104	<p>Local Communities as Partners in Biodiversity Research and Conservation <i>Myrissa Lepiten-Tabao, Visayas Regional Unit, Foundation for the Philippines Environment and Tanya Conlu, Non-Timber Forest Products – Exchange Programme</i></p>
4:00-5:00 CAFA Main Theater	<p style="text-align: center;">Closing Program Emcee: <i>Mr. Carlo Custodio</i></p>
	<p>Message from Incoming President of the Association of Systematic Biologists of the Philippines</p>
	<p>Message from Incoming President of the Biodiversity Conservation Society of the Philippines</p>
	<p>Awarding of Certificates of Appreciation and Participation</p>
	<p>Closing Message from the University of San Carlos</p>
<p>5 April 2014 Saturday 7 am Portal (Main Gate) USC Talamban Campus</p>	<p>Assembly for Olango Island Field Trip</p>

POSTER

T I T L E S

HIGH SCHOOL POSTER PRESENTATIONS

Identification of endoparasites and ectoparasites present in the PSHS-MC squirrel
Ron Rainier A. Esponilla

UNDERGRADUATE POSTER PRESENTATIONS

A Comparative Study on the Ecomorphology of the Philippine Flying Dragon on Different Islands and Between Forest and Non-Forest Habitats

Jessica D. Alcoreza, Anna S. De Castro, Levy Necesito, Bonifacio C. Pedregosa, Sunshine Reinbold and Mae Lowe L. Diesmos

Population Density and Microhabitat Preferences of Camiguin Narrow-Mouthed Frog (*Oreophryne nana*) in Mount Timpoong, Camiguin Sur, Philippines

Christie Marie J. Alorro, Mel Daniel C. Dangel, Dennis A. Warguez, and Philip Godfrey C. Jakosalem

Assemblages, Visitation Rates and Behavior of Birds in Selected Fruiting Trees in Mt. Timpoong, Camiguin Sur, Philippines

Arjay E. Amba, Dennis A. Warguez, Lisa Marie J. Paguntalan, Philip Godfrey C. Jakosalem

Karyotype of a Minute Frog Species *Oreophryne* sp. (*Amphibia:Anura:Microhylidae*) in Agusan Marsh, Bunawan, Agusan del Sur, Philippines, and Notes on its Morphobehavioral Characteristics

Raul B. Balinton Jr. and Cesar A. de la Seña

Diversity, Abundance and Roosting Preferences of Bats in the Caves of Barangay Lower Itil, Balabagan, Lanao del Sur, Philippines

Gerald May Borres, Bradley Bob V. Dela Calzada and Dennis A. Warguez

Above Ground Carbon Stock Assessment of Selected Pine Stands in Baguio City

Aubrey Kate Cadangen and Celia Austria

Habitat Preferences of Ground-Dwelling Small Mammals of Mt. Timpoong, Camiguin Sur, Philippines

Aren Beryl B. Daga, Chloe Tan Yi Ting, Dennis A. Warguez, and Philip Godfrey C. Jakosalem

Diversity, Distribution and Habitat Selection of Kingfishers in Camiguin Sur, Philippines

Janissa A. Fabricante, Dennis A. Warguez, Lisa Marie J. Paguntalan and Philip Godfrey C. Jakosalem

Diversity and Abundance of Stream Frogs in Camiguin Sur, Northern Mindanao

Gerrie Mae A. Flores, Dennis A. Warguez and Philip Godfrey C. Jakosalem

Ecological Importance of Formicidae Species within a Protected Area

Rena Jean Gonzales, Jenalie Saturinas and Geonyzl L. Alviola

POSTER

T Diversity of Myxobacteria in Las Piñas – Parañaque Critical Habitat and Ecotourism Area, Metro Manila, Philippines: A Pilot Study

Jason Patrick Z. Jalandoni, Wilhelm M. Javier, Sherwin R. Escurel, Anne Michelle N. Ramirez, Raphael Denisson Orinday, Francez Dennisse J. Peralta, Jerome S. Mercado, Kamille D. Nepomuceno, John Mervin T. Nadala, Rey Mauricio T. Aguinaldo, Renz Marion B. Gamido, Ramon P. Luber, and Ace Bryan S. Cabal

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Southeast Asia Biodiversity Research: Redux?

*Peter K. L. Ng**

National University of Singapore

A land area of 4.5 million square kilometres with 600 million people and a GDP of over US\$2 trillion dollars A region with arguably the greatest range of natural habitats on Earth - extensive coral reefs, mangrove swamps, estuaries, shallow seas, deep-sea systems, rivers, peat and freshwater swamps, lowland and highland rainforests and caves that spans tropical and subtropical zones. An area with perhaps the richest diversity of plant and animal life on the planet ... Southeast Asia is unique in its mosaic of habitats and lifeforms. But it is a region that is facing immense changes and challenges even as it grows in economic might. And it is not just the oft-heard threat of environmental degradation and species loss. Grave though this threat is, I have a greater fear. Whether the citizens of the region really want it in the first place. It centres on a core question- whether regional scientists want to conduct high-quality regional research on its fauna and flora, and be academically independent in the long term.

How can regional biologists collaborate more on the increasingly “international” platform of science so that they have a larger voice – not just to their constituent nationals, but also for their regional friends and international comrades-in-science? Is niche-research in biodiversity the right thing even as most ASEAN universities and institutes benchmark themselves against their Ivy League counterparts in the west and chase impact factors and publishing “cutting edge” science? Biodiversity concerns in the 1990s have slowly evolved to the environmental and climate change worries of the new millennium. Despite this, there are few regional researchers providing the much needed baseline biodiversity for these activities, and of these, many remain provincial and few are major players in their domain. For example, the great majority of top taxonomists of Southeast Asian plants and animals still reside in the West. How can the region become more independent and become a prime mover rather than just a follower?

This wide-ranging talk will look at examples of what has been successful regionally, what its workers can do to reinforce and catalyse research cum collaborations among its scientists, and better integrate with the more mature programs of the West, as well as examine this “fuzzy” concept called “basic science”.



*PETER K.L. NG is Professor at the Department of Biological Sciences and Director of the Raffles Museum of Biodiversity Research, both at the National University of Singapore. He specializes on the diversity and biology of marine and freshwater crabs of the Indo-Pacific and studies the diversity of Southeast Asian freshwater fishes on the side. Throughout his more than two decades of work, he has published more than 500 technical books and papers on these subjects including several in such journals as *Nature* and *Science*. He believes that taxonomy is the basis of all modern biodiversity work, whether ecology, conservation or even management. He sits on the external academic review boards of major organizations like the Smithsonian Institution and the International Commission of Zoological Nomenclature, conservation agencies like the World Conservation Union, global and regional biodiversity bodies like the UN Environmental Programme (UNEP) and on numerous editorial boards of peer-reviewed journals around the world. Lately, the Raffles Museum of Biodiversity Research under his leadership co-organized one of the biggest biodiversity expeditions to explore deep-water fauna in the Bohol Sea in tandem with some Philippine institutions and the National Museum of Natural History in Paris and involving more than 80 scientists from 25 different countries. His track record exemplifies extensive partnerships and collaboration in biodiversity research spanning the different continents.

Guiding Decisions with Biodiversity Knowledge

*Thomas Brooks**

Head, Science and Knowledge Unit, International Union of the Conservation of Nature (IUCN)

The establishment in 2012 of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) has highlighted the importance of biodiversity knowledge in guiding societal decisions. The platform has been mandated to build from existing mechanisms in delivering four functions to allow such biodiversity-informed decision-making: assessment, knowledge generation, capacity building, and policy support. Fortunately, there is much to build from at both the international level (e.g., IUCN) and the Philippine national level (e.g., WCSP and ASBP). I discuss four biodiversity-related assessments, implemented at national level following global standards. The Red List of Threatened Species assesses the risk of species extinction. Globally, 71,576 species have been assessed, with 22,146 threatened. For the Philippines, where Red Listing has been convened by WCSP, 3,798 species have been assessed, with 737 threatened. A sister Red List protocol for assessing risk of ecosystem collapse is currently under development. These Red Lists in turn trigger the identification of sites contributing significantly to biodiversity persistence, for various approaches have been developed (e.g., Important Bird Areas). A global standard for identification of such sites is currently being consolidated as an umbrella for these approaches, and has already been implemented in the Philippines, identifying 1v01 terrestrial, 77 marine, and 50 coastal Key Biodiversity Areas. Many Key Biodiversity Areas are existing protected areas (e.g., 91 in the Philippines), documented through a fourth knowledge product, Protected Planet, by synthesis of national compilations of data into the World Database on Protected Areas (e.g., 49,453 km² of protected areas in the Philippines, covering 11% of the land area and 2% of the sea). All of these assessments document knowledge gaps and hence help prioritization of field research; all are also enabled by capacity building efforts. We can consider demand for this biodiversity knowledge from across four decision contexts: intergovernmental policy (e.g., reporting progress towards the Convention on Biological Diversity's Aichi Targets); conservation action (e.g., monitoring protected area effectiveness); development safeguards (e.g., adhering to the International Finance Corporation's Performance Standard 6); and land- and seascape planning (e.g., informing stabilization of indigenous land tenure). Such knowledge generation, capacity building, and support to policy and practice are likely to be at least as important as assessment, and require investment accordingly.



**Thomas Brooks* heads science and knowledge at the International Union for Conservation of Nature, where his responsibilities include scientific support to the delivery of knowledge products, maintaining interaction with peer scientific institutions, and strengthening the Union's culture of science. Originally from Brighton, UK, he holds a BA (Hons) in Geography from the University of Cambridge (1993) and a PhD in Ecology and Evolutionary Biology from the University of Tennessee (1998). He has previously worked for The Nature Conservancy (1998–1999), Conservation International (1999–2010), and NatureServe (2010–2012). His background is in threatened species conservation (especially of birds) and in biodiversity hotspots (he has extensive field experience in tropical forests of Asia, South America, and Africa).

Contiguous forest cover or broken woodland: testing models of residential development vis-a-vis bird diversity in Antipolo, Taytay, Rizal

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With the growing population of the Philippines, we need more areas to establish subdivisions. Unfortunately, the development of residential areas often negatively impacts bird diversity. In an effort to help guide this so-called “progress”, we assessed the avifauna of three subdivisions with increasing woodland areas: (1) Beverly Hills, the most populated and degraded subdivision with nearly 70% grassland areas; (2) Maharlika Hills, which retained a decent although broken woodland cover; and (3) Fairmount Hills which has enjoyed the protection of environmentally-conscious homeowners who have zealously guarded their woodland and have even set aside a substantial area as a biological preserve. We conducted transect and mist net surveys from January to March of 2014. Biodiversity indices (Berger-Parker, Simpson’s, and Shannon’s) and cluster analysis (via Multivariate Statistical Package) was done to determine which subdivision held the highest bird diversity and so help in formulating residential development guidelines or policies that our country can adopt in order to make our “march of progress” a truly sustainable one.

Re-introduction of *Awaous melanocephalus* Bleeker, 1849 (Biang Bato) in three Antipolo streams experiencing graded anthropogenic disturbance

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The commercial and ecological importance of freshwater fish in the Philippines cannot be overstated. Unfortunately, rates of extinction of freshwater fish remain very high. One of the leading causes is the introduction of exotics. As of 2002, more than forty non-native fish species have been purposefully introduced in Philippine waters for food, recreation and mosquito control. We sought to help reverse this trend by re-introducing the Largesnout Goby, a native of the Laguna De Bay watershed to three Antipolo streams undergoing increasing levels of human disturbance mainly through the disposal of domestic wastes and laundry soap. We first conducted a survey of extant fish species via interview of local fishermen from January to March of 2014. Various native fishing gear were used (bubo, patanga, and gill net) to augment/confirm the anecdotal species list. Fish caught were identified and a preliminary gut analysis was done to assess the ability of the extant food web to support the goby. The dissolved oxygen, pH, total dissolved solids, conductivity, salinity, and temperature parameters were also monitored. One basin from each of the rivers was selected based on the habitat preferences of the goby. The number of adult individuals released depended on basin morphometry.

Comparison of the diversity of ground-dwelling ants in a forested area and a coconut plantation in Bacon-Manito, Bicol, Philippines

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The difference between a forested area and a coconut plantation (converted from a forested area) in Bacon-Manito, Bicol, Philippines was assessed using ant diversity as an indicator of ecosystem health. Three transect lines with four pitfall traps each were laid out across each site for a total of 12 traps per site. Pitfall trap samples were collected every 24 hours for 3 days. A total of 40 species in 1,194 individuals were obtained from both sites. Twenty-two species were collected from the coconut plantation, while 27 species were collected from the forested area, with 9 species shared by both sites. Jaccard's classic similarity index, Sorensen's classic qualitative similarity coefficient, and Bray-Curtis (Sorensen's quantitative) index yielded similarities of 22.5%, 36.7%, and 14.0%, respectively, for the ant species composition of the two sites. For the coconut plantation, the Shannon's diversity index and Simpson's diversity index were 2.114 and 0.8145, respectively, while it was 2.482 and 0.8678, respectively, for the forested site. Shannon's diversity t-test showed a significant difference between the two sites, with the forested area having higher ant diversity when compared to the coconut plantation. These results implied a change in composition of ant species in the coconut plantation, resulting in lower diversity, which suggests a less robust ecosystem.

Diversity, distribution, and habitat association of amphibian fauna of Bunawan, Agusan del Sur with implications for conservation of forest-associated threatened and endemic taxa

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Philippines has been considered as the major center of amphibian diversity and endemism yet the country's amphibian diversity remains underestimated and under threat. This is the case of Brgy. San Andres and Tagbayambang, Bunawan, Agusan del Sur in which amphibian fauna is still unassessed and under threat from habitat conversion and mining. The current study employed transects line and time constrained survey to assess the species diversity, abundance and habitat distribution and preference of amphibian fauna. Twelve 100 – km transects were established on each site across habitat disturbance gradients – secondary forest, cultivated, grassland and small-scale mining area. Finding revealed a diverse array of twenty six amphibian species, 60% of which are Philippine endemics and 15% are endemic to Mindanao. Amphibian diversity was slightly higher at Tagbayambang ($H' = 2.60$) as compared to San Andres ($H' = 2.43$). Multivariate data exploration (CCA) gave high correlations between the amphibian species and habitat variables (18 variables) forming two distinct groups: species that prefer open and seemingly disturbed habitat and species that prefer forested habitat. Amphibians with high conservation value includes the endangered Mindanao endemic *Philautus surrufus*, six vulnerable species including vulnerable Mindanao endemics – *Megophrys stejnegeri*, *Philautus acutirostris* and *Limnonectes parvus* with rather low relative abundances and mostly associated in forested habitats. Results suggest that several threatened and endemic species associated on forest habitats are still present in the area yet presently in threat from forest destruction. Additional research encompassing temporal consideration would yield more insights on amphibian faunal diversity in the area.

**Species limits and biogeography of Philippine Malkohas (*Cuculiformes:Cuculidae*)
from Luzon Islands and Palawan faunal regions**

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The Philippine Malkohas consist of three endemic and conservative taxa. However, ambiguities in their classification emerged due to the paucity of evidences. Therefore, this study aims to determine the species limits and review the biogeographic distribution of Philippine Malkohas. Selected subspecies of *Phaenicophaeus superciliosus* and *Phaenicophaeus curvirostris* were subjected to the system proposed by Tobias et al. (2010) to score the phenotypic differences between allopatric taxa while samples of the monotypic *Dasylophus cumingi* were analyzed through Univariate Principal Component Analysis. Through phenotypic differentiation, one of the possible results is the existence of the new subspecies of the monotypic *Phaenicophaeus cumingi*. Also, this study may warrant the splitting of the subspecies *P.s. cagayanensis* from *P.s. superciliosus* and *P.c. harringtoni* (Palawan Islands) from *P.c. microrhinus* (Sarawak Malaysia) and elevate them to species level.

Macrophyte distribution in the littoral zones of Lake Taal

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Macrophytes play an important role in the aquatic ecosystem since they are good bioindicators and serve as habitat for littoral fishes. This research involves the use of the hydroacoustic method in determining the distribution and abundance of macrophytes in the littoral zones of Lake Taal. Visual observation quantification of macrophyte cover was done by surveying established quadrats in the littoral zones. This was done to identify submerged macrophyte species in Lake Taal and generate a distribution map. Based on the surveys, five macrophyte species were present in Lake Taal. Furthermore, denser macrophyte beds were concentrated in the south basin of Lake Taal. Nutrient levels in the south basin also contributed to heavy macrophyte growth in this area. These nutrients usually come from run-offs from the watershed from residential, commercial, and agricultural areas. The lesser number of macrophytes in the north basin was due to clearing activities due to the construction of fish cages for aquaculture. Furthermore, we were able to observe that there were different dominant species in the north and south basins of the lake, with *Najas indica* being more prominent in the north basin, while *Vallisneria nana* was more common in the south. This study shows that anthropogenic sources of excess nutrients and other activities such as aquaculture play a role in altering the distribution of macrophytes in Lake Taal and how these can have potential detrimental impacts to the littoral zones of the lake.

Diversity and diurnal roosting preferences of cave-dwelling bats in Barangay Plazan and Lower Itil, Balabagan, Lanao del Sur, Philippines

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The diversity and daytime roosting preferences of bats in selected caves of Balabagan, Lanao del Sur were determined from May 28-31 and October 29 - November 5, 2013. Physical parameters and population estimate of each roosting site were also observed. Results yielded a total of 133 individuals belonging to six species namely *Eonycteris spelaea*, *Rousettus amplexicaudatus*, *Miniopterus schreibersii*, *Miniopterus australis*, *Hipposideros diadema* and *Rhinolophus arcuatus-s*. *R. amplexicaudatus* preferred to roost in totally dark ceilings while *E. spelaea* was observed to inhabit in partially illuminated to total dark ceiling, crevices and cracks. *M. australis* and *M. schreibersii* were found to co-exist with each other on ceilings, walls and chambers where there is no illumination. *H. diadema*, species with lowest population estimate, was found to cling on chambers where there is a total absence of light while *R. arcuatus-s*, species with the highest population estimate, tends to roost in a totally dark ceilings and walls. Degree of illumination and type of reliefs are the factors that affect the daytime roosting selections of bats. Information on cave-dwelling bats is highly important since it will serve as basis for the formulation of guidelines in managing caves and its wildlife inhabitants.

Habitat use and foraging behavior of Golden Yellow White-eye (*Zosterops nigrorum catarmanensis*) in Camiguin Island, Northern Mindanao

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Data on the habitat use and foraging behavior of the Golden Yellow White-eye *Zosterops nigrorum catarmanensis* were collected in Mt. Timpoong, Camiguin Island, specifically in the locality of Sitio Lasak-Lasak (primary montane forest) from May 24-30, 2013. A total of 46 point counts was used in surveying bird activity. A 20 m radius plot centered on each point count was selected for habitat sampling. Mann-Whitney test was used to explore differences in habitat requirements and foraging behavior with respect to diurnal variation (AM/PM). Results show that there was a significant difference in the plant height, vegetation cover, and flock size with respect to diurnal variation which indicate dependability of certain feeding behavior and food preference on a particular period of the day. The Golden yellow white-eye preferred habitats with vegetation of thick canopy cover at high altitude. Fruits were the most consumed food type with branches as the frequently used foraging substrate. Although the White-eye's current conservation status is "Least Concern," prevalent habitat degradation and hunting remains a threat to its population. The additional information on its habitat requirements and feeding ecology serve as an important basis for the formulation of guidelines in protecting the Golden Yellow White-eye and its habitat.

**Microhabitat of the Philippine Tarsier, *Tarsius syrichta*, (Linn. 1758)
in a semi-captive environment in Corella, Bohol, Philippines**

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Although there have been significant gains in scientific knowledge about the home range, habitat associations, and social behavior of the wild Philippine tarsiers in the recent years, there is still little progress in the development of captive breeding programs. This study provides data on the characteristics of the microhabitat of the Philippine tarsier, *Tarsius syrichta*, in a 1.7 ha semi-captive environment of the 174 ha Philippine Tarsier Sanctuary in Corella, Bohol. Microhabitat characterization was done during the summer of 2012 by: quantifying the flora and fauna; identifying the sleeping sites; and determining the physical parameters such as light intensity, relative humidity, and air temperature. Up to 5 tarsiers were observed during the entire study. Results showed that tarsier individuals occupied microhabitats with relatively similar sleeping site characteristics, relative humidity, light intensity, and air temperature. Each microhabitat consists generally of small-diameter shrubs with diameter of 1 to 10 cm at breast height. Sleeping sites were recorded to have a mean diameter of 2.28 cm and a mean height of 1.61 m above the ground. Despite similar characteristics of microhabitat vegetation, the sleeping sites are not plant-species specific but may be related to the presence of vertical supports with diameters >1 cm. Vertical position for sleeping was commonly used by *T. syrichta* individuals. Whereas sitting position was most frequently used by expectant mothers, suggesting that availability of supports viable for sitting position is crucial for pregnant *T. syrichta* individuals.

**Spider diversity in the Owl's nest area in the University of the Philippines,
Diliman**

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Spiders compose the largest carnivorous invertebrate group in terrestrial habitats in both natural and urban settings, entailing a major ecological role in both environments. These invertebrates have not been previously studied within an urban area with extensive green spaces such as the University of the Philippines, Diliman. Shrub-level and ground-dwelling spiders from three 5 m x 5 m plots in Owl's Nest, an urban reforested patch dominated by mahogany trees (*Swietenia macrophylla*), were sampled using beat net and pitfall trap methods, respectively. For each plot, 20 trees were beaten and 5 pitfall traps were installed. From 124 specimens obtained, the samples were classified into 9 families, 26 genera and 33 species. The most dominant family was *Tetragnathidae*, which comprised 55% of the total sample, while the most dominant species were *Opadometa grata* (Guérin) (25%), *Leucauge argentina* (Van Hasselt) (13.71%) and *Tylorida ventralis* (Thorell) (10.48%). The following diversity index values were obtained: Shannon-Weiner Index = 2.866, Simpsons Index (D) = 0.1031 and Margalef Richness Index = 6.639. Results showed moderate species richness but with high dominance of *O. grata* in shrub-level vegetation. Considering the relatively small area (approximately 200 m²), the number of obtained species was high. In addition to this, two new Philippine records (species *Opadometa grata* and genus *Cispius* sp.) and one possibly new species (*Pseudopoda* sp.) were collected in this small urban area.

Survey of Philippine eagles and their Nest in the Northern Cordillera Range in Apayao Province

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A series of Philippine eagle surveys and nest searches were conducted in the Northern Cordillera Range in the towns of Calanasan, Pudtol and Kabugao in the Province of Apayao from November 2011 to May 2013. Interviews were also conducted to determine specific sites where surveys may be started. Efforts initially resulted to a series of sightings of individuals and a pair of adult eagles in the northern forests of Calanasan. The pair emerged from the canopy, soared high together and later flew south. Because of the strength of local testimonies, eagle surveys were also conducted in Pudtol where an individual was momentarily seen, and in Kabugao where an eagle pair was also seen mutually soaring. A nest of a Philippine eagle was finally found in the southern forests of Calanasan in March 2013. With characteristics different from those in Mindanao, the nest in Calanasan had a basal area of 0.67 m² and was laid in the upper canopy of an Almaciga tree *Agathis philippinensis* 22 m off the ground within a pristine montane forest at 1098 masl. The nest was inactive then but some evidences within the nesting bowl and on the ground indicate that the nest was only recently used. Comparing the average nearest-neighbor distance known for the eagle nests in Mindanao (Bueser et al. 2003) with the distances of eagle sightings and the nest in Northern Cordillera Range, there could be at least two more nests yet to be found in the range.

Isabela Oriole conservation: saving our golden treasure

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The Isabela Oriole (*Oriolus isabellae*) is a bird endemic to Luzon but is categorized as Critically Endangered under the IUCN Red List (2013); and yet, the Isabela Oriole is one of the least studied birds in the country. Recent surveys from September 2012 to March 2013 of its historical and recent sites have confirmed its presence, with very few encounters, in only two of the four provinces it was previously recorded. These are Isabela and Cagayan, particularly on the western side of the Northern Sierra Madre mountain range. It appears that the species can adapt to lowland secondary forest and forest edges. However, the uncontrolled habitat destruction due to illegal logging and forest conversion largely threatens its existence. With such pressure on habitat loss, resource competition with a closely-related species, the White-colored Oriole (*Oriolus albiloris*), may further threaten the remaining population of the Isabela Oriole. Hence, conservation action is urgently needed to address the anthropological threats to the species and its habitat. Education, awareness and active participation amongst the local government unit and other government agencies, the local communities, and other stakeholders should also be aimed for. Through collaborations with an academic institution, a local NGO, a birdwatching group, the municipal and barangay local government units, and residents in the communities, the ORIS Project was able to jumpstart the efforts for conservation of one of the rarest birds of the world, the Isabela Oriole.

**Ecological studies to promote conservation of the endemic Palawan Forest Turtle
Siebenrockiella leytensis in Palawan Philippines**

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The critically endangered Palawan Forest Turtle *Siebenrockiella leytensis* is endemic to northern Palawan. The reason for its limited distribution is unknown. Earlier studies indicate that the species prefer shaded, shallow to deep, cool, slow-flowing forest streams with soft bottoms and banks. In hope, that ecological studies could explain the limited distribution, the study had of selected streams in northern and southern Palawan; 2) To assess ecological interaction between *S. leytensis* and sympatric species. Accordingly, this study assessed vegetation, food organisms, stream banks, water pH, water and air temperature, land use and human interventions at or near the stream along in 18 streams in nine municipalities covering northern and southern Palawan. Sampling was conducted once in 2011 and once in 2012. Turtle trapping was done in all sites to confirm the presence of the species and species composition. A total of 267 turtles comprising four species of freshwater turtles were caught throughout the sampling period. The Palawan Forest Turtle was only found in the northern part (north of N10°) where it shared its habitat with the Southeast Asian box turtle *Cuora amboinensis* and Asian left turtles *Cyclemys dentata*. The Malayan Softshell *Dogania subplana* on the other hand was only encountered in the southern part (south of N N10°). The analysis of stream habitat characteristics did not show any significant differences between sites with and sites without *S. leytensis*, hence this could not explain the limited distribution.

**Bat flies (Diptera: Nycteribiidae) from selected localities: extending the bat fly
distribution in the Philippines**

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Bats are among the most diverse mammals in the Philippines comprising at least 76 species. Aside from being a large component of mammalian diversity in the country, they also provide a wide array of ecological services including pollination of economically important crops, seed dispersal and forest regeneration, and insect pest control among others. Interestingly, these organisms are exposed to an equally diverse group of ectoparasites. In this paper, we present an assessment of the bat flies (Diptera: Nycteribiidae) in selected localities in the Philippines. Several methods were employed to capture bats from different localities in Laguna (Mt. Makiling), Bulacan (Angat Watershed), and Mindoro (Naujan Lake National Park). Ectoparasites, mostly flies and mites, were manually collected with a pair of forceps and preserved in 70% ethanol. A total of 12 nycteribiid bat fly species were recorded representing at least 56% of the species known from the country. This number includes four species newly recorded on various hosts: *Cyclopodiagarrula* and *C. horsfieldion* *Cynopterus brachyotis* and *Ptenochirus jagori*; *C. horsfieldion* *Pteropus pumilus*, *Penicillidia acuminata* on *Rousettus amplexicaudatus*; and *Eucampsipodaphilippinensis* on *P. jagori*, *R. amplexicaudatus* and *Eonycteris spelaea*. *C. garrula* is recorded for the first time in Luzon. These were on Cuy's work in 1980 which is the most comprehensive account on nycteribiid species. Generally, parasites evolved to minimize harm toward their host. However, in some instances, these parasites create temporary lesions and induce mild skin disorders when they pierce on the host skin to feed. It is generally known that parasitism affects reproduction, roost selection, general health and fitness of the hosts although limited work on this area has been conducted on bats. Being blood feeders, these parasites are also possible vectors of pathogens like bacteria and viruses although there are very limited accounts on these.

Inventory, assessment and conservation of selected threatened, endemic, rare and economic species of seed plants in Mindanao

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The Philippines is a biodiversity hotspot being home to many threatened species. The survival of these threatened taxa face great risks. Thus this study was conducted to inventory, assess and conserve the threatened, endemic and rare species of seed plants in Mindanao. Determination of threatened taxa was mainly based on literatures namely the article of Fernando et al., and Framework for Philippine Plant Conservation Strategy and Action Plan of the DENR. However, botanical trips were conducted to collect representative specimens after necessary permits were obtained. Results revealed a total of 191 species of threatened seed plants reported from Mindanao. Of these, 180 species are angiosperms and 11 species gymnosperms. One hundred thirty-three (133) of these threatened plants are endemic to the Philippines; 46 species are critically endangered; 69 endangered and 69 vulnerable species. Orchidaceae and Dipterocarpaceae contained the highest number of threatened species. Family Melastomataceae have been noted to be all endangered and all endemic to the country. The threatened seed plants were observed in the different mountains of Mindanao with Mt. Malindang (Misamis Occidental) having the highest threatened species. *Ex situ* conservation of 27 threatened species was done in the CMU Fernery and Mt Musuan Zoological and Botanical Garden (MMZBG). Percentage survival ranged from 5 -100% in different potting media which came from seedlings/ wildlings, stem cuttings or plantlets. This research effort proved that *ex situ* conservation for our threatened taxa is possible to combat the vanishing or even the extinction of our threatened flora.

Vascular plants of the peat swamp forest in Caimpugan, Agusan del Sur Province on Mindanao Island, Philippines

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The peat swamp forest is a newly recognized forest type/formation in the Philippines following its discovery to science in 2005. This paper aimed to present the checklist of plant species in the peat swamp forest of Caimpugan, Agusan del Sur, where such information has been lacking. The checklist generated was based on the collected specimens during the rapid assessment on November 2010, intensive fieldworks on September 2011 and in the recent site visit on September 2013. One hundred and one (101) species belonging to 56 families and 81 genera were recorded. *Tristaniopsis micrantha* (Merr.) Peter G. Wilson and J.T. Waterh. and *Thoracostachyum sumatranum* (Miq.) Kurz. are the most dominant species for trees and understory vegetation, respectively. Four (4) species are considered threatened such as *Hoya crassicaulis*, *Lycopodium squarrosus* both are endangered while *Asplenium nidus* and *Myrmecodia tuberosa* are considered vulnerable. The families with the highest number of taxa observed were Rubiaceae (5 genera, 5 species), Orchidaceae (4 genera, 4 species), Euphorbiaceae (4 genera, 4 species), Lauraceae (3 genera, 4 species), Myrtaceae (2 genera, 6 species), Clusiaceae (2 genera, 5 species), Arecaceae (2 genera, 3 species), Pandanaceae (2 genera, 3 species), Poaceae (2 genera, 3 species), Menispermaceae (2 genera, 2 species) and Apocynaceae (1 genus, 4 species). The rank abundance of taxa conforms to the observed percent indigenous and endemism pattern of the country based on the framework for Philippine plant conservation strategy action plan of DENR-PAWB.

The effects of anthropogenic land use on the distribution of butterflies in Negros Oriental, Philippines

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The importance of distributional records for organisms lies in providing supportive documentation as the backbone for conservation planning. A distributional survey of diurnal butterflies was done in the province of Negros Oriental, Philippines, to determine the effects of anthropogenicity on the presence of butterflies in specific localities. All 16 sites with varying habitat modifications and alterations in their landscapes were surveyed. The fieldwork was conducted during the months of May to August 2012. Daily sampling was done in a 12-hour period from sunrise to sundown for two days in each area. One of the most important findings in the survey is that habitats along rivers and lakes provide the last refuge for some species of butterflies. I found negative correlation when number of species was plotted against temperatures. Since the survey covered a very wide geographic range, some areas have significant and others have non-significant results when species dissimilarity was compared. There were significant differences in species richness and diversity among the sites. The habitat heterogeneity caused by anthropogenicity has resulted in the differences in species community and distribution in 16 areas of Negros Oriental examined during this study. The data that were gathered during the survey can be used for preliminary conservation assessments, especially for those species that were distributed in isolated forest patches. It is the purpose of this study to provide this information; therefore it is essential to have an idea of the locations of butterfly species to enhance conservation plans, especially in areas with high anthropogenicity.

The sea turtles captured by coastal fisheries around Panay and Guimaras: documentation, care, tagging, and release

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Working with government and fishers, SEAFDEC FishWorld documented 158 juvenile and adult sea turtles captured or stranded around Panay and Guimaras Islands from 2001 to 2013: 66% green turtles *Chelonia mydas* (41–111 cm in curved carapace length CCL); 23% olive ridleys *Lepidochelys olivacea* (34–73 cm); 11% hawksbills *Eretmochelys imbricata* (20–89 cm); plus a few leatherbacks and loggerheads. About 90% of the green turtles were caught in nearshore fish corrals, mostly between October and May; 60% of the olive ridleys were caught in offshore gillnets and longlines. From fishing villages within 1 km of FishWorld came 38 green turtles, 17 olive ridleys, and one each of the three other species. Of the captured turtles, 114 were released back to sea, 104 with inconel flipper tags. Weak, injured, floating, or sick turtles were nourished and treated at FishWorld during which time they provide first-hand encounters to thousands of visitors. Hatchling hawksbills were found at secluded white-sand beaches in Lawi, Guimaras in Sep 1996, Sep–Oct 1999, Sep 2001, Nov 2006, and Feb 2010. Green turtle hatchlings were found at black-sand beaches in San Jose, Antique in Dec 2007, Aug 2010, and Jul 2012, and in Miagao, Iloilo in Jun 2013. Olive ridley nesters were found near FishWorld in Oct 2006 and Mar 2012. A book about our sea turtle work, *The Pawikan Album* (2010) has been distributed to schools and local government units around the Philippines to engender appreciation and protectiveness towards these endangered species.

Biodiversity in aquaculture ponds and cages and the adjoining mangroves and seagrass beds

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At SEAFDEC/AQD's Dumangas Brackishwater Station in 2009-2010, 18 ponds with water areas from 0.5 to 0.9 ha were used for nursery and growout of fishes, shrimps, and crabs fed various diets. After harvest of the crops and total drain of the ponds, the non-crop or 'bycatch' species were collected, identified, and enumerated. At least 102 species of fishes lived in the ponds, along with 114 mollusks, 44 macrocrustaceans, two echinoderms, two cnidarians, a water snake, and water birds. The pond workers harvested all the bycatch fishes including 15 gobies; palaemonid and penaeid shrimps and portunid and grapsid crabs; and several oyster species. The snails *Cerithideopsisilla cingulata*, *Cerithium coralium*, and *Batillaria zonalis* were abundant 'pests' in the ponds. The same species in the ponds, plus many others, were found in the adjoining mangroves (~15 species of trees). At SEAFDEC/AQD's Igang Marine Station in 2011-2012, species inventories were made in and around the fish cages and the adjoining coral islets, seagrass beds, and sandflats. Some 839 species in 260 families in 20 major taxa were collected or photographed, including 95 species of fishes, 43 macrocrustaceans, 420 mollusks, 51 echinoderms, 97 cnidarians, 53 poriferans, 24 ascidians, and 12 bryozoans, living among 48 species of seaweeds and 4 seagrasses. Most invertebrates and seaweeds attached to the cages and platforms were common in the natural habitats, but some were not. The biodiversity at Igang seems high despite >30 years of operation of the fish cages, and the continuous fishing and gleaning by the locals.

Filipinos for flying foxes: engaging local stakeholders in flying fox conservation in northeast Luzon

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Communally roosting giant fruit bats, or flying foxes, are threatened in the Philippines as it is very easy to hunt them in their roosts. The endemic Golden-crowned flying fox *Acerodon jubatus* is listed as Endangered. The Filipinos for Flying Foxes Program, funded by Save Our Species (SOS), aims to conserve remaining roost sites. The Mabuwaya Foundation is the implementing partner on Luzon. Information is gathered on bat numbers, roost site locations and threats to the bats by conducting field surveys and interviews with hunters and residents. Four remaining flying fox roost sites were so far found in the Northern Sierra Madre Mountains in Northeast Luzon in the municipalities of Baggao (Cagayan Province), Divilacan, San Mariano and Dinapigue (Isabela Province). Baggao has a roost with at least 12,000 bats. Divilacan has a roost with at least 30,000 bats. San Mariano has a roost with about 5,000 bats. The bats in Dinapigue still have to be counted. Divilacan probably has the largest flying fox roost site of the Philippines. Flying foxes are threatened in all these roost sites by hunting. Both in Baggao and in Divilacan, outside traders buy flying foxes from local hunters while in all sites residents occasionally hunt flying foxes for consumption. The Local governments of Divilacan and Baggao have indicated their interest in protecting the roost sites and ban flying fox hunting with local ordinances. An information campaign and community engagement program will be implemented in 2014 to conserve the roost sites.

Revised conservation status assessment for Philippine amphibians

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The IUCN Conservation Status Assessments have served as the basis of numerous Southeast Asia governments' Red Lists, including DENR Administrative Order 2004–15, The Philippine Threatened Species List. Although a substantial improvement over past Red Lists, the IUCN 2004/2008 assessments are now out of date as a result of numerous taxonomic changes, many species discoveries, a decade of targeted fieldwork, thousands of new records, and new information on Philippine amphibian populations in their natural habitats. We comprehensively re-evaluated Philippine amphibians with attention to these new sources of information using the same criteria we originally employed in 2004. A decade of change has resulted in (A) substantial shifts in the numbers of threatened Philippine amphibians, including altered percentages of species in all categories, (B) changes in understanding of which frog families have the greatest proportion of threatened species, (C) increased understanding of the actual threats to species, and (D) a clear list of priorities for continued research and conservation action. Our reassessment results in numerous cases of species that have now been “downgraded” or “upgraded” to lower or higher threat categories, cases of species now taken off the Red List and no longer considered threatened, and a group of species converted to “Data Deficient” (indicating heightened prioritization for targeted future research) principally as a result of refined taxonomy. In this presentation we will discuss our application of IUCN criteria as modified for application to island archipelagos, and review major threats, such as habitat destruction, emerging infectious disease, and climate change.

Crocodiles enhance local fishery productivity: two examples from the Philippines

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We present preliminary results of our assessment on the local fisheries in areas inhabited by the two crocodylian species in the Philippines, namely the Philippine Crocodile (*Crocodylus mindorensis*) which was introduced in Paghongawan Lake (a palustrine lake) in Jaboy, Pilar, Siargao Island Protected Landscape & Seascape (SIPLAS) last April 22, 2013 and the native population of the Indo-Pacific Crocodile (*Crocodylus porosus*) in Rio Tuba River Estuary, Bataraza, southern Palawan. Catch-per-Unit Effort (CPUE) of gillnets in these sites were compared with their corresponding control sites. CPUEs were found higher in areas inhabited by crocodiles. In Paghongawan Lake, mean CPUEs ranged from 1.53 ± 0.77 (SE) to 9.44 ± 7.62 kg/net/hr versus 0.36 ± 0.23 to 2.29 ± 1.46 kg/net/hour in the Control site (Sangay-Lilaw Lake). In the estuarine habitats, mean CPUE in Iwahig Estuary (Control) was determined at 0.23 ± 0.16 (SE) kg/net/hr only while 2.6 ± 0.85 kg/net/hr in Rio Tuba Estuary, with corresponding IPUE (income-per-unit effort) values of 27.88 ± 18.74 Philippine pesos/net/hr and 234.25 ± 76.71 Php/net/hr. Most of the fishes caught in Rio Tuba Estuary were target or food fishes such as rabbitfishes (Siganidae), jacks (Carangidae), and emperors (Lethrinidae) while ponyfishes (Leiognathidae) and other less valued species comprised the catch composition in Iwahig River Estuary. The increased fish catches in areas inhabited by crocodiles might be attributed to several factors such as reduced fishing pressure as the presence of crocodiles discouraged the locals to fish intensively. In addition, crocodiles also play a role in altering the nutrient regime thereby enhancing the aquatic primary productivity of the aquatic ecosystems being studied.

Detection and occupancy of anurans from forest fragments in Cavite, Luzon Island, Philippines

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Majority of the studies on Philippine anurans have focused mostly on species diversity, systematics, taxonomy, and biogeography but very few cover ecological aspects such as population biology and community studies. The study will use ecological models using occupancy modeling to predict potential impacts of forest fragmentation on the province's anuran diversity. Anuran surveys and detailed habitat recordings were done in 84 standardized 100 x 10m strip transects from February to September 2010. Anuran presence-absence data and habitat covariates were used to generate occupancy (Ψ) and detection probability (p) models using PRESENCE v.3.1. Using the proportion of area occupied (PAO), baseline occupancy was computed and used to predict forest fragmentation impacts. Occupancy estimates (PAO) for 15 species were generally higher than the naïve occupancy estimate (Ψ) when detection models (p) were incorporated in occupancy modeling. Endemic species had PAOs of 10-69% while exotic and native species had 10-44%. Best-fit occupancy models included 4 to 17 covariates (mainly fern cover, elevation, air and soil temperatures, number of undergrowth and understorey trees) affecting anuran occupancy. Results show that anurans are indeed far more sensitive in terms of occupancy requirements than reptiles and birds. Generally, forest restricted species (with relatively higher occupancy estimates) were more sensitive to the effects of forest fragmentation compared to forest edge species and generalist species. Results showed that anuran occupancy is not dictated by fragment size but is more dependent on habitat specialization being specialist, forest edge, or generalist species.

Diversity and biomass potential of microalgae in estuary and fresh water ecosystems

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Philippine coastal areas harbor high diversity of microalgae but its list have not been validated due to insufficient documentation because of the archipelagic nature of the country and the lack of resources to monitor all the coastal and inland waters. Hence, this study was conducted to investigate the diversity of microalgae in Liguasan Marsh and Sta. Cruz estuary and their biomass potential to identify prospective species for mass cultivation and industrial use. Samples were collected using plankton net and grown in Bolds Basal Medium. Microalgae were characterized according to their color and morphological features. A total of 83 microalgal taxa were identified, 58 of which are from Liguasan Marsh and 25 from Sta. Cruz estuary. Bacillariophyceae (Diatom) was the most abundant in both areas. Based on Most Probable Number Estimate, 13 Frequently Occurring Microalgae FOM were observed, eight in Liguasan Marsh and five in Sta. Cruz estuary. Among the FOM taxa, only 9 were successfully isolated which include *Chlorella minutissima*, *Gongrosira*, *Neochloris aquatica*, *Nostoc*, *Oscillatoria brevis*, *Phormidium*, and *Scenedesmus communis* from Liguasan Marsh and *Klebsormidium* and *Oscillatoria* from Sta. Cruz estuary. The biomass (gL⁻¹) of microalgae was measured on a 6-day interval. After 42 days, the highest biomass was observed in *Neochloris aquatica* (18.2 gL⁻¹) while the lowest was observed in *Klebsormidium* (2.56 gL⁻¹). It is concluded that *N. aquatica* is a potential microalgal species for biomass production. The economic value of *Neochloris oleoabundans*, could also be true to *N. aquatica*.

Using local attitudes and social values for selecting Key Conservation Areas in Mount Hamiguitan Range

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Strong local community support is a key component for successful on site conservation of key biodiversity areas. Understanding local attitudes and social values towards wildlife and the forest can help determine appropriate conservation measures that will garner local community support. We surveyed 16 barangays with remaining forest cover and surrounds Mount Hamiguitan Range and assessed 37 trigger species for their local importance. Trigger species are threatened and endemic flora and fauna present in the area that will help select areas for conservation. Our data showed that among the 37 trigger species, only 17 species were known to the locals. *Pithecophaga jefferyi*, for example, was only recorded in three out of the 16 barangays. Our data also showed that local attitude towards wildlife is limited to negativistic, utilitarian, naturalistic, scientific, ecological, and aesthetic. We also asked locals to mapped utilization or social values of forested areas within their barangay and results showed that biologically important areas were also used for local economic activities like farming as well as damaging activities like mining. There were also forested areas outside the core protection zone that needs to be assessed and validated for conservation and protection. These areas were divided into three possible protection mechanisms: Protected Area Expansion (Barangay Talisay, Maputi and La Union in the Municipality of San Isidro), Local Conservation Areas (Barangay Surop, Tiblawan, Upper Tibanban, Oregon, Luzon in the Municipality of Governor Generoso) and Critical Habitat declarations (Barangay Cabuaya, Macambol, Luban and Lanca in the City of Mati).

From subspecies to species, applying the Tobias criteria on Philippine birds

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Avian taxonomy is indeed a dynamic process, with many changes occurring in the past decade, particularly with the advent of molecular phylogenetics and digital call analyses. This has resulted in numerous taxonomic splits, elevation of races to full species and re-arrangements of birds at either the family or order level. Since these changes, a common consensus regarding validity of taxa and use of species concepts has been a long-standing issue in Ornithology, which remains unresolved. However, a criterion for defining species limits in birds was proposed by Tobias et al. in 2010 (*Ibis* 152: 724) and provides a standard basis for validating taxonomic status in birds at the species and subspecies level. Its application in addressing the problems of polytypic species had been promising in many Asian birds, including the treatment of subspecies for the enigmatic Greater Flameback *Chrysocolaptes lucidus* (Collar 2011). In this paper, I present results of the application of the 'Tobias criteria' in delimiting several polytypic Philippine birds (sunbirds, hornbills), and provide recommendations on their taxonomic status. Further analysis on other Philippine birds using these criteria may help resolve some taxonomic issues and contribute to understanding the current number of species recognized in the archipelago.

Three new species of *Musseromys*: why does it matter?

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Recent field surveys and museum-based studies show the existence of four species of *Musseromys*, three of which were previously unknown. The new species of this tiny tree-mouse, related to the giant cloud rats, show that evolution and diversification of mammals within Luzon has been even more extensive than previously known. They also show that arboreal small mammals are more diverse than previously thought; that this genus probably originated in the Central Cordillera (where two species currently live); and has evolved primarily in high elevation mossy and montane forest. Two species co-exist on a local scale with up to four other members of the cloud rat clade, each differing substantially in body size. The presence in the northern Sierra Madre of an endemic species further reinforces the importance of that area as a unique center of biodiversity deserving of protection. The ecology and distribution of the four species are poorly known, opening new opportunities for further research on the remarkable Philippine mammal fauna.

Small is beautiful: conservation partnership for rural development with Indigenous peoples in Mindanao

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Equitable partnerships with Indigenous peoples have been touted as being key to successful biodiversity conservation projects within ancestral domains. However, not much has been written about cases that articulate the details and nuances of such partnerships and how it might play out on the ground. Using a social constructionist research paradigm and a critical social theory lens, I articulate how an equitable partnership can be conceptualized, designed and implemented with potentially meaningful results not only for biodiversity conservation, but more importantly for the wellbeing of Indigenous custodians of biodiversity habitats. Drawing on interviews and ethnographic studies of ancestral domain sustainable development planning in Mindanao, it is argued that holistic community engagements underpinned by Indigenous rights and worldviews and principles of social and economic justice yields more meaningful results than those obtained from either conventional top-down and paternalistic bottoms-up approaches. I further demonstrate that as opposed to a centralized approach to ancestral domain planning, village-based approaches that engage traditional, informal institutions and local knowledge can bring about equitable benefits and can build a stronger sense of community autonomy, competence, and belongingness. In conclusion, for community-based conservation to carry greater weight for rural Indigenous households, simplified and generalized assumptions must be abandoned. Engagement should not be on the basis of a romanticized and essentialist notion of Indigenous communities as “noble savages” and “environmental stewards”, but on the basis of addressing actual needs as influenced by worldviews, capabilities, values and aspirations as they hold them at present.

Soil-vegetation interrelationships of tree species in a lowland forest in the Puerto Princesa Subterranean River National Park

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In this study, we determined the association between the ten most important tree species and selected soil parameters in the jungle trail of Puerto Princesa Subterranean River National Park (PPSRNP). Soil and vegetation data were collected from 30 sampling sites along a 3-kilometer transect. The ten most important tree species out of the 106 species sampled were chosen based on their importance values. Using Canonical Correspondence Analysis (CCA), soil parameters were tested against data on vegetation producing two axes. The first axis was an axis of pH while the second axis denoted soil fertility. Tree species which preferred more basic soils included *Hernandia ovigera* and *Intsia bijuga*. On the other hand, *Durio* sp., *Casearia grewiifolia*, *Dimorphocalyx murinus*, and *Intsia bijuga*, preferred areas with relatively lower soil fertility. It was also observed that majority of the sites possessed relatively acidic soil. In addition, most portions of the lowland forest (Hill 1 and 2) possess low soil fertility. Using the data obtained from CCA, we can predict areas where growth of certain species would be optimal thus enabling forest managers to select which species are better suited for reforestation activities based on their adaptability to different environmental gradients.

Diversity and characterization of epiphytic macrolichens of Caliking, Atok, Benguet

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A survey of the epiphytic macrolichen diversity and distribution was conducted under agroforest conditions in Caliking, Atok, Benguet. Four study sites were compared namely: dipterocarp forest, coniferous forest, dipterocarp forest with intermittent coffee plantation and along cultivated vegetable farms. The macrolichen survey was done using non-quantitative transect sampling method. Phenotypic analysis based on morphological, anatomical and chemical characters was performed on collected macrolichen species for taxonomic identification. Morphoanatomical characters were evaluated using microscopic observation. Chemical characters were determined through the spot color test and thin layer chromatography (TLC). The diversity of the lichen species was determined using Shannon and Simpson diversity indices. Seventy (70) species of corticolous macrolichens belonging to thirteen (13) genera were collected and identified in the four (4) study sites. The highest number of identified macrolichens belongs to the family Parmeliaceae with a total of thirty (30) genera of lichen species. The other lichens identified belong to families Coccocarpiaceae, Cladoniaceae, Collemataceae, Lobariaceae, Physciaceae and Ramalinaceae. Comparing the different sites as to macrolichen diversity, corticolous macrolichen species were more diverse and evenly distributed in undisturbed sites such as the dipterocarp and coniferous forest than in sites that are constantly exposed to anthropogenic activities as in the case of agricultural sites.

Amorphophallus adamsensis, an addition to the Philippine Flora

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There are 213 known species of *Amorphophallus* Blume ex Decne. distributed around the world. Of these, ten species were known from the Philippines, until recently an eleventh was found from Northern Luzon. It resembles *A. dactylifer* and *A. rostratus*, but can be distinguished from these two by having much longer leaflets with longer acumen; narrow triangular and much longer spathe; presence of purple to brown unbranched finger-like projections inside the spathe base; lobed or auriculate limb; and, much longer male zone with distant flowers. This species was named *Amorphophallus adamsensis*, derived from the name of the locality where it was accidentally found. *A. adamsensis* is a new addition to the rich flora of the Philippines.

Notable threatened trees and its potential as seed source for restoring the lowland rainforest of Central Panay Mountain Range

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Central Panay Mountain Range (CPMR) is one of the two remaining contiguous rainforest in the island of Panay. It plays a critical role not just as an important source of water for the 18 municipalities around it but is home to many island endemic and threatened species like the big 5 of Panay. With only about 8% of the original forest left, the lowland forest vegetation of CPMR had been largely destroyed. Trees belonging to the Dipterocarpaceae family which used to be the dominant species of the lowland rainforest of CPMR are now threatened. They had been replaced by exotic species used in reforestation which does not support local biodiversity. Recently, the use of native species in forest restoration efforts of CPMR had been gaining ground. However, many of the threatened tree species are still not being planted in most of these efforts. The German International Cooperation (GIZ) through the Forest and Climate Protection (ForClim) Panay project, assisted by Haribon Foundation, conducted a bio-survey in CPMR. The floral survey result shows the distribution of recorded threatened tree species found in CPMR from a total of 12 plots established (200 m² each) between 180 masl to 700 masl in four sites. A total of 13 threatened tree species were identified and recorded during the study. Locating threatened species can play an important role in restoring the lowland rainforest of the CPMR. They serve as valuable seed source for the increasing initiatives to rehabilitate degraded lowland rainforest with native species.

Implications of forest restoration in the Philippines: The Haribon Foundation Experience

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Basic human needs are indeed crucial for survival. These needs are sufficed by ecosystem services which are directly dependent on the condition of our natural resources, particularly our forests. Our forests provide habitat for the wildlife and even reflect the biological diversity in a particular ecosystem. Forests are vital in the over-all quality of life's web-cycle and hydrologic cycle. As experts acknowledge the importance of our forests, paralleled with the urgent need to stop and reverse their continuing loss and degradation, collegial discussions among experts and practitioners affirmed the need to promote rainforestation technology in the Philippines. This gave birth to a movement in 2005 which aims to restore one million hectares of Philippine rainforests using native tree species by the year 2020 or the ROAD to 2020 (Rainforest Organizations and Advocates to year 2020). Realized and indeed proven effective, concerted efforts among partner corporations, local government units (LGUs), other government agencies and people's organizations gave the opportunity to implement rainforestation in almost 500 hectares of deforested areas. This paper describes Haribon's experiences in planting indigenous species in forest restoration areas, emphasizing important technical considerations including the various socio-cultural factors that may have influenced the native trees' growth and survival over time. The adopt-a-seedling program of the movement supplemented the incomes of the partner forest-dependent communities who engaged in rainforestation. This significantly contributed in the survival of the seedlings planted. Choosing the appropriate pioneer species and suitable restoration site, partnering with pro-active local governments and legitimate community organizations, are among the important observations noted. The perpetual commitment to nurture and protect the native trees, provision of sustainable livelihood and uninterrupted monitoring remain the biggest challenges in the implementation of rainforestation initiatives.

One animal's trash is another animal's treasure: fecal samples as the non-invasive key to fruit bat conservation genetics

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Non-invasive genetic sampling has not yet been applied to the conservation of any of the 196 species of Old World fruit bats (Pteropodidae). We tested the use of fecal samples from two mixed-species colonies (*Acerodon jubatus*, *Pteropus vampyrus*) as a non-invasive source of DNA for species identification and study of population genetics and ecology. Using cytochrome b primers with product length of 513 base pairs, we had an 85% success rate of amplification for 151 fecal samples. Species identification detected unexpected patterns in roosting behavior in the bats. Sixteen percent fecal samples collected under *A. jubatus* roost trees were identified as *P. vampyrus* and 3% of samples matched bat species previously unknown from these roosting areas. Genetic variation at the cytochrome b locus suggested structure among populations of the endemic, *A. jubatus*, which is consistent with this species' higher degree of ecological specialization. This non-invasive method promotes greater understanding of the ecology and conservation status of threatened fruit bats without the risks of traditional methods.

Reproductive biology of christian crabs (*Charybdis feriatius* Linnaeus, 1758) in San Miguel Bay

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The reproductive biology of *Charybdis feriatius* was investigated from April 2012 to March 2013 to determine gonad maturity, GSI, fecundity, breeding cycle and size at first maturity. Monthly sample of 30 specimens was randomly collected for gonado-somatic index (GSI), gonad maturity, and fecundity. Gravimetric and volumetric methods were used to estimate fecundity and GSI based on gonad weight/total weight (100). Maturity Stages based on Kumar et.al. (2000) and Islam S. and Kurokura, H. (2012). Finding showed that *Charybdis feriatius* is a continuous breeder with a distinct period of peak reproductive activity during NE monsoon with peak in January where higher values of GSI, matured, and ovigerous females observed. Mean GSI of female and male were 7.35 and 6.27%. Ovigerous females were present year round, the highest occurring in December (50%). Fecundity ranges from 1,513,660 to 6,357,133 eggs. Smallest reproductively active female was 8.3cm. The fecundity relationship with size showed high correlation ($r^2=0.92$). Recommended options include: (1) close season, (2) catch regulation, (3) no taking of egg-bearing swimming crabs, and (4) egg-bearing crabs contained in a spawning tank and allowed to release its eggs and the larvae released in fishing ground or marine protected areas.

A survey of plants used as repellents against hematophagous insects by the Ayta people of Pampanga province, Philippines

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Most popular plants with insect-repellent activity are non-native to the Philippines and can pose ecological threat when propagated for its utility. Indigenous knowledge provides a wealth of information on native plants with such potential application. To document the insect-repellent plants used by Ayta people from Porac, Pampanga, Philippines, an interview was conducted among 121 informants aged between 20–60 years old from five villages in December 2011, and March and April 2012. Data was analyzed using the use-value (UV) and informant consensus factor (FIC). The survey resulted in a list of 54 species of plants classified in 49 genera and 26 families. The most important plants based on their UVs include 7 species and were mostly exotic plants. *Blumea balsamifera* DC. and *Phyllodium pulchellum* (L.) Desv. were the only native plants listed as most important. *B. balsamifera* is a popular medicinal plant known as sambong and is traditionally used as an abortifacient while *Phyllodium pulchellum* is used to treat bleeding problems. These plants are novel citations for insect repellent property and could be more explored in future studies. The FIC value (0.74) indicates that the Ayta agree in their selection of plants. Most of the plant parts used are the leaves and stems, which are dried and then burned. The smoke is said to drive away the insects. The present study provides baseline for phytochemical screening for insect repellent compounds. It also serves as an important ethnobotanical documentation of the Ayta community whose culture is slowly being eroded by acculturation.

Malacological survey along the intertidal zone of Las Piñas-Parañaque critical habitat and ecotourism area (LPPCHEA)

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A malacological survey was done along the intertidal zone of Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA). The only critical habitat located within Metropolitan Manila, LPPCHEA hosts about 5,000 heads of migratory and native bird species that feed on its mudflats and breed in its mangrove forests. As such, it was chosen as the core site for the study. The sampling protocol utilized was adapted from the Natural Geography In-Shore Areas (NaGISA) method for rapid and regular monitoring of beach and shoreline sites. Samples were collected from three sites in LPPCHEA within three successive weekends (November 2012) to determine the mollusk species that thrive in the area's intertidal regions. After which, molluscan families that serve as prey for birds were determined. Thirty four molluscan families were identified, 15 of which belonged to Class Bivalvia and 19 to Class Gastropoda. Twenty eight species were bivalves and 35 were gastropods. Out of the 34 mollusk families, 22 were found to be the major source of the birds' nourishment. Literature on species-specific interaction between avian predators and molluscan prey supported the observation that migratory bird families preferred mollusks in their diet more than native avian residents of LPPCHEA.

Species richness and distribution of Cladocera (Branchiopoda: Anomopoda and Ctenopoda) in Philippine Inland Waters

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Cladocera is one of the most abundant groups of zooplankton that serves as food for fishes and as a good indicator of the health of aquatic ecosystems. This paper updates the diversity and distribution of cladocerans in freshwater ecosystems in the Philippines. Previously collected samples from the University of Santo Tomas – Zooplankton Reference Collection (UST-ZRC) together with more recent collections (January to October 2013) were analyzed. Results indicate the presence of 15 species from families Moinidae, Bosminidae, Sididae and Chydoridae compared to the 56 species that were reported in previous studies. Moinids and bosminids were mostly encountered in the islands of Luzon and Mindanao but rarely found in the major islands in the Visayas while families Sididae and Chydoridae were more distributed throughout the country. Families Sididae and Chydoridae are considered as the most diverse of the four families inhabiting Luzon, Mindanao and some of the major islands in Visayas. Though six species of chydorids have been identified in this study, researchers observed very limited number of chydorids in sampling locations where they have been collected. Recent alterations to freshwater ecosystems may have also contributed to the disappearance of some species through changes in water quality and the introduction of non-native species. Though no new novel species have been identified from these four families, results suggest interesting distribution patterns among these taxa.

The biodiversity partnerships project: mainstreaming biodiversity conservation through national agencies, conservation groups and local government units' collaboration initiatives

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The government's effort to protect biodiversity has been the establishment of a protected areas system (NIPAS). However, it excludes other critical connective habitats which are significant for biodiversity conservation. The Key Biodiversity Areas (KBAs) and production landscapes surrounding protected areas are important for connectivity of key biodiversity corridors. If neglected, the result is a highly fragmented landscape of unsustainable agricultural and incompatible land uses exposing remaining natural habitats to threats. These are evident at the LGU level. The LGUs are responsible for integrated management of lands under their jurisdiction, including PA/KBAs and the production landscape. The Partnerships for Biodiversity Conservation: Mainstreaming in Local Agricultural Landscapes, otherwise known as the Biodiversity Partnerships Project is a 6-year project implemented by the DENR-PAWB funded by the GEF and UNDP. BPP aims to address habitat fragmentation brought about by inadequate policies, tools and capacities to encourage participation of LGUs in mainstreaming biodiversity conservation in land use and development activities. BPP intends to increase the capacity of LGUs to include biodiversity conservation in production landscapes/seascapes geared towards protection and enhancement of the quality of the environment and sustainable natural resources management. The project involves a 3-pronged approach: strengthen enabling policies at the national level; enhance capacities of LGUs; and demonstrate at the local level the improved capacities particularly in 8 pilot sites across 5 biogeographic regions in the Philippines. BPP works in partnerships with NGAs, LGUs, and national/local conservation NGOs.

Evidence for a novel natural *Begonia* hybrid from Panay Island, the Philippines

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Begonia is a mega-diverse genus and is an ideal model for examining modes of speciation in the tropics. In the Philippines, many *Begonia* species are narrow endemics, in particular those restricted to forest on limestone. However, a small number have wider distributions which increase the potential for contact between species. Here we report the first account of Philippine *Begonia* hybridization in the wild from Bulabog Puti-an Natural Park in Dingle, Iloilo Province, Panay Island. A population with novel morphology was found growing on moist, coralline slopes at 200 m elevation. Based on a comparison of morphology, cytology and molecular evidence, we conclude that the *Begonia* population represents progeny from natural hybridization between *Begonia copelandii* Merr. and *Begonia rhombicarpa* A. DC.

Enhancing the adaptive capacity of the indigenous peoples by promoting sustainable and community-based resin tapping of Almaciga (*Agathis philippinensis* Warb.) in selected certificate of ancestral domain title (CADT) areas in Palawan and Sierra Madre

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Almaciga is a large tree reaching 60 meters height and 300 centimeters in diameters found at altitude of 200 to 2,000 meters, mostly in natural forests of ancestral domains in Palawan and Sierra Madre. Almaciga yields high quality resin known as Manila copal, used as raw material for varnish, lacquers, paper size, paint driers, linoleum, printing inks, and other uses. Manila copal is considered an important dollar earner among the country's non-timber forest products. From 2000 to 2009, an average of 202,400 kilograms of Manila copal valued at US\$ 188,900 were exported to France, Germany, Japan, Spain, China and Switzerland. Collection of resin is an important source of income for indigenous peoples (IPs). However most of them practice unsustainable tapping methods leading to resin yield decline and worst, death of trees. If these malpractices prevail, almaciga are prone of extinction affecting the livelihood of communities depending from it. Furthermore, with climate change as a global concern, recurrence of natural calamities like typhoons and forest fires will have impacts on forest ecosystems, particularly vulnerable and threatened species like almaciga. Through this project, training and technology transfer were conducted to capacitate and educate the IPs on proper and sustainable resin tapping methods and basic knowledge on climate change related issues. Now, the IPs together with concerned government agencies (i.e. LGUs, DENR, NCIP) recognized the importance of protecting almaciga trees. Policies on sustainable resin harvesting and the inclusion of almaciga to National Greening Program (NGP) were recommended to DENR, LGUs and NCIP.

Conservation of the Palawan forest turtle *Siebenrockiella leytensis*– a holistic approach

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The Palawan forest turtle *Siebenrockiella leytensis* is critically endangered, endemic to the Philippines and restricted to parts in the province of Palawan. At the same time it is one of the world's least known species. To fill knowledge gaps needed for its conservation, KFI adopted the species as focal species of its Philippine Freshwater Turtle Conservation Program (PFTCP). The present paper reports on key findings of the program since 2006 such as the species composition of freshwater turtles in Palawan and the reason for the limited geographic distribution of *S. leytensis*. It reports on the results of telemetry studies that brought evidence for high site fidelity and territoriality of *S. leytensis*. It presents research on the diet of *S. leytensis* that revealed the important role of the species in the environment as e.g. seed disperser and pest reducer. It highlights the importance and effectiveness of environmental education, the insufficient knowledge of communities about environmental laws and the deficiencies in law enforcement. It elaborates on habitat requirements of *S. leytensis* and provides evidence for habitat degradation being the 2nd most threat to the survival of the species. It shows solutions for habitat protection and restoration. Finally, it reports on the progress in captive husbandry at the assurance colony in Narra and the difficulties in captive breeding *S. leytensis*.

Populations of the critically endangered Palawan forest turtle *Siebenrockiella leytensis* continue decreasing – results of long term studies

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The present study assessed the conservation status and trends in population sizes of the critically endangered Palawan forest turtle *Siebenrockiella leytensis*. Long-term mark-recapture studies were conducted from 2008 to 2012 in three selected streams in Palawan (Puerto Princesa City, Roxas and Taytay). Study sites ranged in stream length from 400-890m. Turtles were captured with baited traps. Habitat conditions and threats were assessed for each site. Population sizes were estimated with different methods (Petersen Method, Schumacher & Eschmeyer Method, Jolly-Seber Method). The Jolly-Seber Method provided the most reliable estimates. In combination with survey results from another 18 different sites, we estimated the total population size of the species at some 3,000 individuals. Population densities were calculated as 2.12 individuals/100m² at the site in Puerto Princesa City, 0.23 and 0.19 individuals/100m² in the sites in Roxas and Taytay, respectively. As per estimates, population trends were fairly stable in the site in Puerto Princesa City, but steeply decreasing in Roxas and only seemingly stable in Taytay. To sum up, results indicate a general decrease in the population size of *S. leytensis* as a consequence of habitat destruction and over-exploitation. *Siebenrockiella leytensis* is and remains critically endangered in line with IUCN criteria and habitat conservation and restoration in combination with strict law enforcement are urgently needed to avoid local extinction.

Deep sea chitons (Polyplacophora) on sunken wood

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Natural deposits of sunken wood provide an important habitat for deep-sea invertebrates. Chitons (class Polyplacophora) are distinctive marine molluscs with eight shell plates, found in oceans worldwide, in coastal habitats and deep sea. Recent work on deep-sea chitons living on sunken wood has illuminated the surprising diversity, phylogenetic significance, and potential vulnerability of animals living in and near the Philippines. The collecting efforts of the Muséum National d'Histoire Naturelle (Paris) over the last decade have procured material that provides new insights to the biodiversity of the deep sea benthos in the south Pacific, in a region ranging from the Philippines, to the Solomon Islands and Vanuatu and south to New Caledonia, with a special focus on the astonishing diversity found on natural deposits of sunken wood and plant matter. This material has included eight species of chitons. Many of these chiton species look superficially similar, and indeed the eight species currently recognized is probably an under-estimate, with cryptic or pseudo-cryptic species yet to be identified. For example, this recent research has separated two species that were previously synonymised. One feature that distinguishes the newly-recognised species is a bizarre ecto-parasitic bryozoan (moss animal) known from a cluster of deep-sea stations south of Bohol Island. Further work on these animals will reveal more diversity as well as answering globally significant questions in dispersal, species diversification patterns, and phylogenetics.

Conservation genetics and trade forensics of Philippine sailfin lizards

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Despite rampant coastal development throughout Southeast Asia, studies of conservation genetics and ecology of vulnerable, coastal species are rare. Large bodied vertebrates with highly specialized habitat requirements may be at particular risk of extinction due to habitat degradation and fragmentation, especially if these habitats are naturally patchily distributed, marginal, or otherwise geographically limited, or associated in space with high human population densities or heavy anthropogenic disturbance. Particularly telling examples of these conservation challenges are large Philippine reptiles with obligate habitat requirements for lowland, coastal and mangrove forests. Plagued by habitat destruction due to high human densities along coastlines, sprawling rural development, and rapidly developing estuarine fisheries industry, coastal forest reptiles are experiencing rapid declines. And yet studies of population biology, genetics, and habitat requirements of species depending on these environments are few. We conduct an integrative conservation genetic study on large-bodied, Philippine Sailfin Lizards (genus *Hydrosaurus*). In doing so, we identify significant evolutionary units for conservation, model suitable habitat in the Philippines from extensive occurrence data and evaluate the efficacy of the current protected area network, and identify the source of *hydrosaurus* in the illegal pet trade. Together, this integrative study characterizes a conservation urgency of particular significance: the genetically distinct Sailfin lizards of the Bicol faunal region, with suitable habitat virtually unprotected, and clear evidence of heavy exploitation for illegal trade. This is the first conservation genetic study to evaluate the potential effectiveness of the protected landscape coverage in the Philippines, a Megadiverse nation and Biodiversity Hotspot.

Fungal flora of Batanes Group of Islands: a lesser known group of organism in the Philippines

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The province of Batanes comprises the isolated northernmost group of 10 islands and several islets in the country at 20023'14" N, 121057'40" E. The unfavorable climatic conditions due to frequent strong winds and its remoteness from mainland Luzon have contributed to the province's isolation, with the result that biodiversity data from the islands were meager until the last three decades, when biological exploration was conducted by C.B Robinson, an American mycologist and plant pathologist working in the Philippines. The present study is the second exploration in Batanes and it enumerates and describes other fungi and their distribution in the islands. It has been done in the different vegetations such as lowland forest, mossy, montane, and grassland to document other fungi and fill in the gap of fungal diversity studies in the province. Thus, a preliminary floristic survey of the fungal flora of Batanes Group of Islands was conducted at Mt. Iraya, Mt. Matarem, and Savidug. Five transect lines were established from 100m to 1,000m asl with an interval of 200m between quadrats. Species richness and relative abundance of the species along altitudinal gradients were measured and the different taxa were collected, recorded, and examined. Opportunistic sampling method was also used during the survey. A total of 68 species in 27 genera and 18 families were collected, representing 15% of the total species reported in the province. Of these, twelve new species records of Philippine fungi, namely, *Auricularia polytricha*, *Cantharellus infundibuliformis*, *Ganoderma applanatum*, *Hexagonia tenuis*, *Microporus xanthopus*, *Polyporus pictipes*, *Pycnoporus sanguineus*, *Schizophyllum commune*, *Trametes corrugata*, *Tremella fuciformis*, *Xylaria polymorpha* and *Tarzetta cupularis* are reported. The present collection forms the first record for the twelve species in Batanes Group of Islands. A detailed description, with relevant notes, and photographs are provided.

Conservation status of Philippine eagles in Leyte: what we currently know

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We summarize the state of current knowledge about Philippine eagle populations in Leyte. Extant populations of the IUCN “critically endangered” Philippine Eagle is known in four islands of the archipelago, with most knowledge on the species drawn mainly from work on Mindanao, supplemented by records from Luzon and Samar islands. In contrast, the conservation status of eagles in Leyte has scarcely been investigated, with such “absence of evidence” (no careful research has been done yet) being (mis)taken by a few investigators for a probable “evidence of absence” (extirpation) of the species on the island. Using a mixed methods research approach that combine literature reviews, population surveys, key informant interviews, and public perception studies we describe the conservation status of Philippine eagles on Leyte. Field observations, literature summary, and the extent of potentially suitable habitat indicate that the latest estimate for the island is most likely an underestimate (i.e. 2 pairs). Detection rates in Leyte are relatively low, but whether such low detection reflects perilously low densities or a rather behaviorally cryptic nature of an otherwise viable population remains a matter of speculation. Initial perception surveys in study sites indicate high rural awareness of the conservation plight of the species and people’s willingness to help with conserving the bird. Wildlife hunting, timber poaching and agricultural expansion were rampant in all study sites though, which has the potential to reduce prey base and habitat. We conclude that the Leyte population deserves equal and urgent attention and recommend ways to address such need.

Cave bats of Pisan, Kabacan, Cotabato, Philippines with notes on the local threats and disturbance and its implication to conservation

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Caves and cave bat conservation is one of the top most concern in the field of global bat conservation efforts. Many networks and organizations locally and internationally were exerting effort, time, and dedication to conserve and protect the only flying mammal in the world. In the province of North Cotabato, the village of Pisan is known for the presence of karst caves which were visited for tourism, nutrient mining and hunting. In 2006, a pilot study to assess the presence and diversity of cave bats in accessible cave sites, and it was followed by separate studies in 2009, 2010 and 2013. Cave studies have resulted in identifying 16 species of bats namely *Cynopterus brachyotis*, *Emballonura alecto*, *Eonycteris spelaea*, *Haplonycteris fischeri*, *Hipposideros c.f. ater*, *H. diadema* *H. c.f. pygmeus*, *Macroglossus minimus*, *Megaerops wetmorei*, *Miniopterus australis*, *M. tristis*, *Myotis horsfieldii*, *Pippistrellus javanicus*, *Ptenochirus jagori*, *Rhinolophus arcuatus* (s), and *Rousettus amplexicaudatus*. There were also unconfirmed occurrence species *Eonycteris robusta*, *Hipposideros cervinus*, *Rhinolophus rufus* that need to be confirmed in further studies. Conservation education programs were also conducted to escalate understanding and appreciation of cave bat ecosystem services and to lessen various local disturbance in the area that includes hunting, unregulated tourism, deforestation, and guano mining. The increasing richness and unconfirmed species during surveys may indicate that there are more species of cave bats await to be documented. Continuous occurrence of threats and disturbance in the sites calls for an urgent, strong and efficient conservation intervention.

The diversity and conservation of birds and bats of Calanasan, Apayao, northern Cordillera, Luzon, Philippines

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The Apayao Lowland Forest area in the Northern Cordillera of Luzon has been identified as a Key Biodiversity Area. Very little is known however of the biodiversity of northern Apayao. From 2010 – 2013, we conducted seven biodiversity surveys in lowland and montane forest in the municipality of Calanasan. We found extensive, near pristine, forest areas at both lower and higher elevations. We used point counts, transect counts, opportunistic observations and mist nets to observe birds and fruit bats. 138 bird species and 12 fruit bat species were found, many of them new records for the northern Cordillera. The most spectacular find was the documentation of the presence of the Philippine Eagle in the northern Cordillera. Partly based on the survey results, the local government of Calanasan is protecting a large range of the Philippine Eagle habitat, covering both lowland and montane forest, under a traditional protected area system: the Lapat. This presentation will provide an overview of the observed species and will discuss the conservation value of northern Apayao and the current traditional conservation system in place here.

Exploring ex situ conservation of *Aglaomorpha cornucopia* (Copel.) M.C. Roos: A rare and endemic fern from the Philippines

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Aglaomorpha cornucopia (Copel.) M.C. Roos is an endemic and rare epiphytic fern from the Philippines. Moreover, this species is in a vulnerable category due to its limited geographic range and area of occupancy. This study was conducted to document the reproductive biology to explore the possibility of ex situ conservation. Results show that it produced 64 yellow monoete spores per sporangium. Fresh spores germinated 100% within 1 week culture and remained completely viable even after one-year storage under cold temperature storage (3°C). Spore germination was of Vittaria-type, and gametophyte development was of Drynaria-type. Adult gametophytes were heart-shaped, and gametangia were of the leptosporangiate type. Both antheridia and archegonia occurred after 7 weeks culture. After 13 weeks culture, gametophytes began to sexually produce sporophytes, evidenced by its spore number/sporangium, the doubled genome size of its sporophyte relative to gametophyte, and the clear separation between the tissue of gametophyte and sporophyte. The rate of sporophyte production reached 64% after 26 weeks culture. Results of this study suggest that cold temperature spore storage and in vitro culture offer reliable ways for conserving this rare fern. The sporophytes thus produced could also be used for horticulture and ornamental, in addition to the restoration.

Identification of endoparasites and ectoparasites present in the PSHS-MC squirrel

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Recent sightings of squirrels (*Callosciurus finlaysonii*) have been circulating around Manila and other parts of Quezon City these past few months (abs-cbnnews.com, June 27, 2013). Squirrels have been known to be carriers of endoparasites and ectoparasites which are potential vectors of diseases (Durden & Musser, 1994). Known as an invasive species, the lack of a natural predator also makes it harder to maintain the population growth of these animals (Palmer, Koprowski, & Pernas, 2007) This research aims to determine the presence endoparasites or ectoparasites in any of the squirrels captured within the area of Philippine Science High School - Main Campus. The squirrels were captured using Tomahawk traps (Kosoy, Muray, Gilmore, Bai, & Gage, 2003) with mango bait that were placed on different trees around the campus, from March to December 2013. Based on morphometric analysis, the squirrels that were caught were found to be *Callosciurus finlaysonii* (Francis, 2008) The squirrels had an average of 193g in weight, 16.96cm in tail length, 20.34cm in head-body length, 1.73cm in ear length, and 4.02cm in hindfoot length. Permits were acquired from the DENR-NCR-PAWCZMS, the specimens were euthanized in the Ninoy Aquino Parks and Wildlife Center and were subjected to parasitic analysis in the Laboratory Services Division of the Bureau of Animal Industry. Nine adults squirrels were tested, four of which were male and the remaining five were female. Mites were found present in one of the squirrels. Endoparasite analysis has also shown nematodes and other worms.

A Comparative Study on the Ecomorphology of the Philippine Flying Dragon on Different Islands and Between Forest and Non-Forest Habitats

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The comparative method, long a central tenet of evolutionary biology, interprets among species correlations between morphology and ecology as evidence for adaptation¹. The first step in this study is the search for the causes of discontinuities, which may arise gradually by either geographic or ecologic separation. While the former is an event in which the populations occupy different areas and are separated either by distance or by a physical barrier, the latter is an event in which the populations occupy essentially the same area but different habitats within the area². Once these discontinuities have developed in the population, environmental conditions will differ from one area to another. Hence, the members of a population are exposed to different selective forces and will come to differ from one another. Here, we determined that there are significant differences in the morphology of the Philippine Flying Dragons *Draco spilopterus* from Negros and from Luzon and from forest and non-forest habitats (geographic discontinuity). Thus, at these given localities and habitats, the lizards form distinct morphological clusters. Moreover, we established that a negative linear correlation exists between the morphology of *D. spilopterus* and its relative perch height (ecologic discontinuity) - that is, individuals that are more arboreal have shorter limbs and more streamlined morphology.

Population density and microhabitat preferences of Camiguin Narrow-mouthed Frog (*Oreophryne nana*) in Mount Timpoong, Camiguin Sur, Philippines

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The Camiguin endemic *Oreophryne nana* is considered by the International Union for Conservation of Nature (IUCN) as Data Deficient. To further provide data on this species, a study on microhabitat preferences of *O. nana* in the Lasak-lasak area of Mount Timpoong, Camiguin Sur was conducted on 24-31 May 2013. The population density of this species was also determined on 18-28 October 2012 in Danao and Pamahawan localities of Mt. Timpoong and 24-31 May 2013 in Lasak-lasak area. Line transect method was used in estimating population density. A total of 124 100-meter transects was surveyed and a 10x10 circular plot was used for gathering information on microhabitat preferences. Result shows that *O. nana* average calls heard per transect is 16 in Danao, 13 in Pamahawan and 12 in Lasak-lasak. There is a significant relationship between the number of calls heard and elevation since the number of calls heard increases as elevation increases. All individuals of *O. nana* were found perching on a leaf with an average height from the ground of 61 centimeters. There is a significant relationship between perching height and leaf litter percentage and between perching height and leaf length with correlation coefficient value of 0.462 and 0.450 respectively. Hence, perching height increases as the % leaf litter and leaf width increases. Based on available data on the mating calls of *O. nana* in Camiguin Sur, the researcher recommends a "Least Concern" status for this island endemic frog.

Assemblages, Visitation Rates and Behavior of Birds in Selected Fruiting Trees in Mt. Timpoong, Camiguin Sur, Philippines

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A study on the assemblages, visitation rates, and behavior of birds in selected fruiting trees in the primary forest, secondary forest and plantation area in Mt. Timpoong, Camiguin Sur was conducted on 23-31 May 2013. A total of 25 fruiting trees was selected and observed for 15 minutes for presence of avian visitors, frequency and length of visitations, and behavior. The contingency coefficient was used as measure of association between various variables of fruiting tree characteristics and avian visitations and behavior. A total of 130 avian visitors from eight avian families were observed to be visiting the fruiting trees. Avian assemblages under the family *Zosteropidae* were the most observed visitors, while feeding on the fruit or flower was the frequently observed behavior among avian species. Results show that there was a significant association between avian behavior and the length of visitation with a contingency coefficient of 0.450, showing that birds which stayed more than 31 seconds on fruiting trees most likely be feeding and picking on the fruit or flower. The characteristics of a fruiting tree like diameter at breast height, tree height, fruit size and color were found to have a significant association with presence of avian visiting species. These characteristics play a great role on the trees ability to attract potential avian visitors and dispersers. It shows that fruiting trees and avian visitors are mutualistically-associated and interdependent for each other's survival, thus conservation and protection of the species and its habitat are highly recommended.

Karyotype of a minute frog species *Oreophryne* sp. (Amphibia:Anura:Microhylidae) in Agusan Marsh, Bunawan, Agusan del Sur, Philippines, and notes on its morphobehavioral characteristics

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Agusan Marsh Wildlife Sanctuary (AMWS), biggest marsh in Southeast Asia, contains a rich but hitherto barely studied amphibian fauna. A recent inventory reported two minute frog species belonging to genus *Oreophryne* that are suspected to be new to science. This study describes the karyotype of one of those species, and documents some of its morphological and behavioral characteristics. Ten mature frogs were obtained by acoustic and opportunistic sampling from a site bordering terminalia forests in AMWS. They were reared and observed in an enclosure before they were karyotyped. Metaphase spreads were routinely prepared by squashing intestinal epithelial cells from colchicine-treated frog samples. Chromosome analysis indicated a normal diploid karyotype of $2n=22$ including four metacentric and seven submetacentric chromosome pairs, without distinguishable sex chromosomes. This differs with *Oreophryne birio* from Australo-Papuan region which consists of $2n=26$ chromosomes. Unlike the two known *Oreophryne* species in the Philippines, this species is smaller in size (SVL 14.5-19mm), the dorsum exhibits a conspicuous mid-dorsal line with two broad dark stripes on the back. Ground colors vary from yellow, brown, orange and gray. Eggs are 2-3 mm in diameter and develop directly into juvenile frogs (SVL 4-5 mm) within 25 days. The male frogs produce unique calls and exhibit signs of territoriality with egg-guarding behavior. The present findings provide novel cytogenetic and morphobehavioral information that are vital to the taxonomy and conservation of a unique Philippine frog species, and to the understanding of the mechanisms and rates of speciation in genus *Oreophryne*.

Diversity, abundance and roosting preferences of bats in the caves of Barangay Lower Itil, Balabagan, Lanao del Sur, Philippines

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A study on the diversity, abundance and roosting preferences of bats in the two caves of Barangay Lower Itil, Balabagan, Lanao del Sur was conducted from May 28-31 and October 29 - November 5, 2013. Physical parameters and population estimate of each roosting site were also observed. A total of four species of insectivorous bats was recorded, namely; *Rhinolophus subrufus*, *Hipposideros ater*, *Miniopterus schreibersi* and *Miniopterus australis*. It was noted that *R. subrufus* is found to occupy singly or in groups in small cavities of totally dark area. *H. ater* is seen clinging on the walls and it also occupied smaller holes but most of this species was observed hanging on ceilings where light cannot pass through. *M. schreibersi* and *M. australis* are cohabitants that occupy the ceilings in groups and also clinging singly on walls of totally dark areas. This research serves as a baseline data to be used for future conservation of the two caves and its inhabitants.

Above ground carbon stock assessment of selected pine stands in Baguio City

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This study is a quantitative assessment and comparison of above ground carbon stock in four sites namely, Camp John Hay (CJH), Busol Watershed, Camp 8 Watershed, and University of the Philippines Baguio (UPB). The assessment was done using non-destructive sampling of tree biomass and deadwood necromass, and destructive sampling of understory vegetation biomass and litter necromass. The allometric equation developed by Banaticla was used to calculate the tree biomass which was then later converted to carbon stock. The total carbon stock of CJH Forest estates, and CJH Eco-trail, Watershed, Camp 8 Watershed and UPB Pine stand are 76.61 ton ha⁻¹, 80.86 ton ha⁻¹, 92.52 ton ha⁻¹, 40.15 ton ha⁻¹, 56.87 ton ha⁻¹, and 55.02 ton ha⁻¹ respectively. Given these values, the vegetation cover in CJH is classified as young regrowth forest, but with occasional patches of older forest within the stratum; while Busol watershed, Camp 8 Watershed and UPB pine stand are identified to be recently cleared areas, some woody regrowth and grass-like ground cover. It is recommended that more comprehensive assessment of remaining forest stands in Baguio City be done and inclusion in the assessment of the influence of the physical factors be studied. Furthermore, it is recommended that policy makers in the city give attention to efficient forest conservation land use management strategies for the remaining pine stands in the city.

Habitat preferences of ground-dwelling small mammals of Mt. Timpoong, Camiguin Sur, Philippines

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Camiguin Sur has high endemism with five indigenous species of non-volant small mammals; however, little had been studied on the habitat ecology of these species. A survey on the habitat preferences of ground-dwelling small mammals in Mt. Timpoong, was conducted on 24-31 May 2013 on four selected sites using live traps for a total of 180 trap nights. Habitat variables were assessed for each trap using a 10x10 meter plot. Total capture accounted three non-native species: *Rattus tanezumi*, *Suncus murinus*, and *Rattus exulans*; and two native species: *Crocidura beatus* and *Rattus everetti*. *C. beatus* was captured in sites 1 and 2, while non-native species were captured in all sites except in site 4 where only *R. everetti* was captured. Contingency Coefficient was used to determine the association between habitat variable and occurrence of a species. Co-existence of *S. murinus* with *C. beatus* suggested difference in usage of microhabitat (herb height 0.21-0.3cm, number trees >4, leaf litter depth <6cm) as well as competition over the same resources (25% grass cover, emergent height <10m). Difference in microhabitat preference of *R. everetti* (emergent height >16m, 50% grass cover, herb height 0.21-0.3cm, absence of trees, leaf litter depth >6cm) and non-native rat species (emergent height 10-15m, 25% grass cover, herb height <0.2cm, presence of trees, leaf litter depth <6cm) resulted to spatially distinct populations suggesting advantage of *R. everetti* in utilization of habitat over non-native species. Thus, native species were able to form stable populations in the presence of opportunistic non-native species.

Diversity, distribution and habitat selection of kingfishers in Camiguin Sur, Philippines

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The diversity, distribution and habitat selection of kingfishers in Camiguin Sur were studied on 18-28 October 2012, 26-31 May 2013 and 14-15 September 2013. Line transect method was used to survey six different vegetation types: primary forest, secondary forest, mixed forest, plantation, riverine forest and shrubland. A total of 66 500-meter transects was surveyed and a 10x10 m circular plot was used for habitat assessment. Contingency Coefficient was used to measure the relationship between the species and the variables while Independent Samples t test was used to measure if there is a significant difference in the habitat variables between two species. Five species, consisting of 49 individuals, were recorded in the study area. These include the Variable Dwarf (*Ceyx lepidus*), White-collared (*Todiramphus chloris*), White-throated (*Halcyon smyrnensis*), Rufous-lored (*Todiramphus winchelli*) and common kingfisher (*Alcedo atthis*). Result shows that there is a significant association between kingfishers and vegetation type. *C. lepidus* and *T. winchelli* are more likely seen in primary forest while *T. chloris* is more likely seen in secondary forest and plantation. On the other hand, *H. smyrnensis* is likelier seen in mixed forest and *A. atthis* is likelier seen in shrubland. Also, there is a significant difference in the canopy height and percentage of canopy cover between *C. lepidus* and *T. chloris*. However, there is no significant association between kingfishers and presence of water. The gathered data can serve as basis for the formulation of guidelines in protecting the kingfishers of Camiguin Sur.

Diversity and abundance of stream frogs in Camiguin Sur, Northern Mindanao

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A study on the abundance and diversity of stream-dwelling frogs was conducted in Camiguin Sur, Northern Mindanao on 24-31 May and 14-16 September 2013. A total of 42 100-meter transects along the stream was surveyed. A 5x5 meter plot was selected for habitat assessment. Independent t test was used to measure if there is a significant difference between the habitat variables. A total of five species of frogs belonging to three families (Ranidae, Dicroglossidae and Ceratobatrachidae) was recorded in Camiguin Sur where all species are Philippine endemic. *Hylarana grandocula* was the most abundant and common species recorded. Statistical results show that variables such as temperature, relative humidity, stream width and pH were shown to have a significant influence on frog diversity and abundance in Camiguin Sur.

Ecological importance of Formicidae species within a protected area

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Ants are highly diverse social invertebrate located in different habitats. Some become pest or endangered because of habitat alteration. This study aimed to provide an account of Formicidae species and determine its ecological importance. The ants were collected along the parameters of the protected area of Malagos Watershed. Using an improvised pipet and preserved in separate containers. After studying its morphology and taxonomy, there were four subfamilies recorded like the Myrmicinae, Formicinae, Ponerinae and Dolichoderinae. Family *Myrmicinae* known as generalist predators and seed harvesters. Two species were identified belonging in this family namely, *Pheodole fervens* and *Solenopsis geminata*. Another predator group were the family Ponerinae which preyed on termites rotten logs or leaf litters and often seen in middle canopies. Members of this family were the *Diacamma rugosum*, *Leptogenys diminuta* and *Odontoponera denticulata*. However the remaining subfamilies were scavengers or farmers like the *Dolichoderus thoracicus* in subfamily Dolichoderinae. Because these group tend aphids or an arthropods. Aside from scavenging and farming, the family Formicinae also fed on nectar among the flowering trees which plays a vital role in pollination. Species identified were *Odontomachus rioxosa*, *Polyrhachis abdominalis*, *Polyrhachis illaudata* and *Iridomyrmex anceps*. These families were distributed from understory to upper canopies, except for the two families which were in the leaf litters. These families of ants performed specific behavior on a certain habitat. Each species played an important role in maintaining the balance of the watershed.

Diversity of Myxobacteria in Las Piñas – Parañaque Critical Habitat and Ecotourism Area, Metro Manila, Philippines: A Pilot Study

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Myxobacteria are highly social microorganisms and are prolific producers of bioactive compounds. They are also important in the nutrient cycle of carbon since most of them are cellulolytic and chitinolytic. This study aimed to determine the diversity of myxobacteria in Las Piñas – Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) since data on its diversity is lacking. We employed polyphasic approach in the identification of myxobacteria in our study site. Culture-dependent method was used to obtain myxobacteria from decaying bark, leaves, soil, sediment, mudflat and water samples while biochemical tests and microscopy were used for the phenotypic analyses. Lastly, amplification and sequencing of Myxobacteria 16S rDNA gene were done for genotypic and phylogenetic studies. Varying morphology of fruiting bodies was observed from the collected samples. Microscopy showed gram-negative rods with myxospores containing visible transparent center. All myxobacterial isolates gave positive result for catalase test. All isolates grew well on CEL3 agar with cellulose as sole carbon source as thin film to thick slimy films with swarms gliding on the entire surface with radial vein pattern typical of myxobacteria. Isolates 6A, 14A, 15A, 5A-F, LI Brown, LI Yellow, and 8B-2 exhibited chitinolytic property when cultivated on chitin agar. Simple sugars were utilized in less than two days while poor growth was observed in broth containing complex carbohydrates. Preliminary identification based on morphological characterization especially of its fruiting bodies and myxospores revealed that the isolates belong to the genera *Cystobacter*, *Myxococcus*, *Chondromyces* and *Sorangium*. Genotypic and phylogenetic assays are in process.

Preliminary report on the amphibians and reptiles of Taguibo Watershed, Butuan City, Agusan del Norte, Philippines

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Taguibo Watershed provides potable water in the entire Butuan City and municipalities of Magallanes and Remedios T. Romualdez, but has suffered anthropogenic activities such as massive land cover modifications and deforestation. Surveyed only during the 1950s, with no follow – up herpetological surveys to date, we provide species account and microhabitat preferences of the amphibians and reptiles on Barangay Pianing, Taguibo Watershed, Butuan City. Fieldwork was conducted from May 29 – June 7, 2013 employing visual encounter technique in two sites at elevations 300 and 500 masl. Specimens were prepared for museum collection and deposited at the reference collection of Fr. Saturnino Urios University. We support our new survey data with historical data from museum database information to provide comprehensive species account of the amphibians and reptiles in the area. Newly synthesized data from our survey work and the California Academy of Sciences museum database recorded a total of 18 species of amphibians (5 new records; 12 Mindanao faunal region endemics) and 23 species of reptiles (16 new records; 8 Mindanao faunal region endemics), with overlaps in microhabitat preferences. Even with limited sampling effort, the presence of new records of which many are Mindanao faunal region endemics, highlights the importance to preserve and protect Taguibo Watershed. We strongly suspect that Barangay Pianing, and many other areas of the Taguibo Watershed still have many important undocumented species of amphibians and reptiles, to which we suggest more comprehensive herpetological surveys focused on notes on basic natural history and ecological data.

Diversity of streptomycetes in Las Piñas – Parañaque Critical Habitat and Ecotourism Area, Metro Manila, Philippines: a pilot study

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Streptomyces is a genus of filamentous bacteria that includes more than 500 species occurring in both terrestrial and aquatic habitat. They are known to be the leading producers of microbial-derived bioactive secondary metabolites and are important in biogeochemical cycling of carbon. In this study, we aimed to identify the different species of streptomycetes present in Las Piñas – Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) which was declared as the first Critical Habitat in the Philippines and one of the two remaining mangrove forest in Metro Manila. Reports on the diversity of streptomycetes in LPPCHEA are lacking and warrants investigation. We employed polyphasic approach in the identification of Streptomyces species in our study site. Culture-dependent method was used to obtain Streptomyces from soil, sediment, mudflat and water samples in LPPCHEA while biochemical tests and microscopy were used for its phenotypic analyses. Lastly, amplification and sequencing of Streptomyces 16S rRNA gene was done for genotypic and phylogenetic studies. Seven distinctly different velvety colonies with earthy odor which are typical of streptomycetes were isolated from soil, mangrove sediment and mudflat samples. Microscopy revealed gram-positive rods with mycelia and spores. All isolates were positive for catalase production. Cellulose was utilized by all 7 isolates. Isolates 5A Green and LIB exhibited chitinolytic property when cultivated on chitin agar. Isolates grew in broth containing simple sugar as sole carbon source 10 days after inoculation. Genotypic and phylogenetic assays are in process.

Corticolous lichens (with new records) of the Hundred Islands, Alaminos, Pangasinan

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The Hundred Islands is a National Park located in the province of Pangasinan, northern Philippines. The islands (124 at low tide and 123 at high tide) are actually ancient corals and are believed to be about two million years old. Corticolous lichens are epiphytes that have grown on barks of trees in the island. This study is a survey of the lichens using quadrat sampling. Only six islands were visited: Governor's Island, Marcos Island, Clave island, Children's Island, Quezon Island, and Cuenco Island. Other islands were not visited due to lack of docking area, distance from the mainland and for safety reasons. The lichens were identified based on their morpho-anatomical and chemical characteristics. There were at least 23 species identified distributed in nine families. Three narrow-lobed foliose lichens namely, *Dirinaria applanata*, *Pyxine cocoes*, and *Heterodermia* sp. belong to family Physciaceae. All the rest are crustose lichens: *Arthonia didyma* Arthoniaceae, *Thelotrema brasiliensis*, *Diorygma hieroglyphicum*, and five species of *Graphis* of the family Graphidaceae; *Lecanora helva* of Lecanoraceae; two species of *Pyrenula* of family Pyrenulaceae; *Bacidia medialis* of Ramalinaceae; *Opegrapha apomelaena* and *Sclerophyton madagascariense* of the family Stereocaulaceae, and two species of *Marcelaria* of the family Trypetheliaceae. Five of the lichens identified are believed to be new records for the Philippines. This shows that there are still many lichens in the Philippine Islands that need to be discovered and identified.

Species accounts of anurans within the protected area

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Anurans are widely distributed in moist vegetated areas of Mindanao. They serve as ecological indicators and controllers of other invertebrates. But these cold blooded vertebrates were highly affected when a slight change of habitat had taken place. This study aimed to determine species of anurans and its status within the watershed of Malagos. Samples were collected along the parameters of watershed and immediately examined their morphology and classification. After classifying all the samples collected, there were seven species of anurans found within the protected area. These species were *Limnonectes magnus*, *Ferjervarya cancrivora*, *Kalophrynus pleurostigma*, *Hylarana grandocula*, *Rhinella marina*, *Polypedates leucomystax* and *Megophrys* sp. One out of six, the *Rhinella marina* was an invasive species competing with native anurans. Most of the observed species were not threatened except for *Limnonectes magnus* which was nearly at threat. Each species were specialized based on habitat type and food preferences but some are generalist. Most anurans are widely distributed in different areas as long as high moisture content in the environment.

Habitat preferences of *Loriculus philippensis camiguinensis* in Mt. Timpoong, Camiguin Sur, Northern Mindanao

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Habitat preferences of *Loriculus philippensis camiguinensis* was investigated on 18-28 October 2012 and 23-31 May 2013 in Mt. Timpoong, Camiguin Sur. Surveyed sites include different forest types: primary, secondary and mixed forest. A total of 49 500-meter line transects was surveyed through aural and visual search. Habitat variables were assessed using 10x10 meter circular plot. Results show that in terms of tree height, *L. p. camiguinensis* prefers tall trees measuring 15 – 20 meters with a confidence level of 7.70 – 0.93483. *L. p. camiguinensis* also prefers diameter at breast height (DBH) of trees ranging from 56.6776 to 75.8912 cm, tree density ranging from 5.1697 to 9.4950 number of trees per 10x10 meter plot, and canopy cover between 42.2595 – 75.8672 %. Results indicate that tree height, tree density and increase in canopy cover attribute to the presence of *L. p. camiguinensis* in Mt. Timpoong. Although Mt. Timpoong is a protected zone, habitat degradation and bird hunting still occur in the area. Data collected serves as baseline information for the formulation of conservation measures of this species and its habitat.

Distribution, abundance and microhabitat preferences of swiftlets in selected caves of northwestern Mindanao, Philippines

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Swiftlets are the most common cave-dwelling birds. This study was conducted to determine the distribution, abundance and microhabitat preferences of swiftlets in selected caves of northwestern Mindanao. A series of sampling was done in 2012 and 2013. A total of three species was observed, namely; *Collocalia esculenta*, *Collocalia troglodytes* and *Collocalia vanikorensis*. *C. troglodytes* was the species inhabiting the caves of Balabagon, Lanao del Sur and Guipos Resort cave in Zamboanga del Sur. *C. esculenta* can be found in Balabagon, Lanao Del Sur and Bacolod, Lanao del Norte while *Collocalia vanikorensis* inhabits only the Tubigan cave in Initao, Misamis Oriental. Major threats to the swiftlets include nest harvesting, littering and habitat destruction through limestone quarrying.

In vitro culture of *Strongylodon macrobotrys* A. Gray (Fabaceae) using low-cost gelling agents and organic additives

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The study aimed to micropropagate the Philippine endemic plant, *Strongylodon macrobotrys*, commonly known as Jade Vine using low-cost options like alternative gelling agents (gulaman and sago) and organic additives (coconut water and banana extract). With low-cost options, the micropropagation of our endemic species may be more affordable. A total of seven (7) set-ups were used in this research with only one (1) control set-up: positive (agar + modified MS medium), three (3) gulaman set-ups (a. banana b. coconut water c. both) and three (3) sago set-ups (a. banana b. coconut water c. both). After inoculation, only the gulaman and control set-ups formed calli within four days. Based on the results, gulaman exhibited as a better alternative gelling agent and the combined use of coconut water and banana extract was more effective compared to using only one of the two.

Diversity, distribution and microhabitat preferences of frogs in Mt. Timpoong, Camiguin Sur, Philippines

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The diversity, distribution and microhabitat preferences of frogs were studied from 23-30 May 2013 in the primary and secondary forests of Mt. Timpoong, Camiguin Sur. Visual Encounter Survey was used to conduct searches on randomly selected areas. A 10x10 meter plot was selected for microhabitat assessment. Contingency coefficient was calculated to determine the degree of relationship between species and microhabitat variables. A total of nine species was recorded in which seven species (78%) are Philippine endemics. *Platymantis naomii* and *Limnonectes magnus* are Vulnerable and Nearly Threatened species respectively. Vegetation at primary forest showed the highest number of individuals and species. Arboreal microhabitat showed the highest number of species. Microhabitat variables such as humidity and tree density were found to be significantly related to the frogs' abundance. With the dire need to protect and promote conservation programs, the gathered data will serve as a baseline information in the making of guidelines to protect the frogs of Mt. Timpoong.

Mixed-species bird flocks in a tropical montane forest, Mt. Timpoong, Camiguin Sur, Philippines

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A study on mixed-species bird flocks in Mt. Timpoong, Camiguin Sur was conducted on 23-31 May 2013. The species composition, size, frequency, diversity and abundance were described. Differences on morning and afternoon data were also compared. Point count transect with 50 meters distance between each observation points was done along two kilometers of trails. There were 29 species, belonging to 15 families, with a total of 418 individuals recorded. Columbidae and Muscicapidae have the most number of species participating in flocks. Yellowish White-eye (*Zosterops nigrorum*) was the most frequent species (20.8%) in the flocks. Regression analysis was used to correlate the flock size with the number of species present in a flock while Independent samples t test was used to explore differences in morning and afternoon transects. Results show that the flock size was positively correlated with the number of species present ($r = 0.521$) indicating that as the flock size increases, the number of species participating in mixed-species flocks also increases. The morning and afternoon transects have no significant difference in terms of mean flock sizes and number of individuals per species but there is a significant difference in the abundance of species with t value of 2.052 which means that morning transects are more abundant in species compared to afternoon transects. This study could be used in understanding biological phenomenon of flocking and thus, contribute to the knowledge of the overwhelming biodiversity of Camiguin. However, further studies are necessary to fully understand the processes involved in such association.

Diversity of freshwater gastropods in Lakes Taal, Sampaloc and Laguna de Bay

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Gastropods comprise 80% of the species belonging to Phylum Mollusca, making it the most diverse class in the phylum. Of these, freshwater gastropods are the least studied due to the dullness of their physical attributes. This remains to be the case in the Philippines where updates on the biology of freshwater gastropods are lacking. This study aimed to identify and classify the gastropods present in the three major aquaculture lakes in Luzon Is., namely Lakes Taal, Sampaloc, and Laguna de Bay, through thorough examination of their radula, shell, and digestive system. A total of 3,896 samples were obtained and 17 species were identified inhabiting the three lakes, with *Tarebia granifera* dominating the three lakes which comprised 35% of the total samples obtained while the least observed was a planorbid snail, *Indoplanorbis exustus* which only comprised 0.02% of the samples. Of the three lakes, Lakes Taal and Sampaloc had more similar values for species diversity compared to Laguna de Bay. Furthermore, this study has been able to establish 9 new records; *Tarebia granifera*, *Thiara winterii*, *Thiara scabra*, *Indoplanorbis exustus*, *Thiara* sp., *Melanoides maculata*, *Vivipara burroughiana*, *Bellamya angularis* and *Pomacea canaliculata* - which includes three non-native species. This study shows how gastropod diversity in these three major lakes have already been impacted by changes in water quality and the introduction of non-native species which may have implications on over-all ecosystem health given the role of gastropods as major prey items, fisheries commodity and as final or intermediate hosts of parasites.

Critical habitat establishment for *Rafflesia speciosa* in Barbaza, Antique

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One critical habitat (CH) has been established in Central Panay Mountain Ranges (CPMR) and in the whole Region 6 through a local government unit (LGU) initiative. The LGU Barbaza has finally approved Municipal Resolution No. 91 series of 2013 declaring portion of Barangays Marigne and San Ramon as a critical habitat for *Rafflesia speciosa* covering around 15.99 hectares. This resolution does not solely protect the critically endangered *Rafflesia speciosa* but also protect and conserve other important flora and fauna species in the Key Biodiversity Area (KBA). *Rafflesia* is considered as the world's largest flower. It has no stem, no branch, not even leaves. The flower is actually a parasite. It grows within its host the tetrastigma vine. A survey team was organized by LGU Barbaza to validate the presence of rafflesia in upland barangays of San Ramon and Marigne based on community reports. Results showed that *Rafflesia speciosa* buds and flowers covered an area of about 15.99 hectares. The entire area is threatened by kaingin, wildlife hunting and perennial grass fire. Series of stakeholders' consultation such as workshops and meetings have been conducted in preparation for the formulation of Critical Habitat Management Plan (CHMP). A CHMP will be jointly developed by the Department of Environment and Natural Resources R6, LGU Barbara and other relevant parties, which would provide direction for its effective and efficient management. CHMP will be enacted as an ordinance by LGU Barbaza to continuously protect and conserve this rare flora species in the world.

Characterization of flying fox roost in Malones, Dalaguete, Cebu, central Philippines

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Flying fox roost in Malones, Dalaguete, Cebu was characterized using semi qualitative techniques. Roosting trees were identified up to species level and measured in terms of dbh, height, crown diameter and percent crown cover. Likewise, relative distance of roosts to existing habitation, cultivated fields and established roads were noted. Ground coordinates were also obtained using GPS receiver. The roost was visited three times and flying foxes roosting were counted per species. Disparity of data was remedied by taking the average of three readings obtained at the same time by three enumerators. Results show that the area is generally in a deep and narrow valley bottom with seven minor roosts. Seven out of 13 roosting trees are figs (balete). Roosting trees stands from 12 to 30 meters and have crown diameter from 5 to 17 meters. Roosting trees were observed as above the general layer of the canopy. The roost is unique with the four species of flying foxes namely *Acerodon jubatus*, *Pteropus pumilus*, *P. vampyrus* and *P. hypomelanus* being found. Most common species is *P. hypomelanus* with an average count of 324 while the least is the endangered *A. jubatus* with only 5 although a significant decline of individual count was experienced in the last data collection. The passage of a municipal ordinance and organization of forest wardens ensure the protection of the roost from intruders although hunting activities in their feeding areas remain a challenge in conservation.

Update on avian species accounts of Malagos Watershed

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Birds are always used in studies as biological indicators for ecological condition. Using the characteristics of birds, it enable us to compare their distribution within the habitat. This study was conducted at Malagos Watershed to update the bird species list from several avian observation done in the area using the line transect and mist netting method. It was found out that six families were no longer observed in two avian surveys. These families were Oriolidae, Ardeidae, Apodidae, Coraciidae, Scolopacidae and Sylviidae. However nine bird species were added in the list namely: Artic Warbler, White-breasted Waterhen, Philippine Frogmouth, Greater Flameback, Barn Swallow, Philippine Falconet, Reddish Cuckoo-dove and Chinese Goshawk. A total of 102 birds listed combining all avian studies done in the area. Philippine Frogmouth and Philippine Falconet were endemic in the country and least concern based on red data list. Therefore Malagos Watershed is a forest fragment that harbors diverse avian species in a very disturbed location.

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Species distribution mapping of five threatened species in Panay Island

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The Central Panay Mountain Range (CPMR) is located in western most side of the Island of Panay, Western Visayas, Philippines, stretching from Mount Madia-as in north and Mount Baloy down south covering four provinces attributed with seven major watersheds. A species distribution survey of five highly threatened species of CPMR were conducted as secondary baseline study subjected for field validation which is supplementary to the proposed Critical Habitat (CH) establishment of five Local Government Unit candidates identified. These species are *Aceros waldeni* (Writhed-billed Hornbill), *Sus cebifrons* (Visayan Warty Pig), *Varanus mabitang* (Panay Monitor Lizard), *Rusa alfredi* (Visayan Spotted Deer) and either two species of *Rafflesia*, *Rafflesia speciosa* and *Rafflesia lobata*. The inputs of survey were recorded from Key Informants Interviews, data gathering module process of Forest Land Use Plans, ethno-bio surveys and other secondary data. The locations of inputs were translated into geographical coordinates using GIS and overlaid with thematic data like vegetative cover, drainage system and contour lines to generate CH Species Distribution Maps of 16 municipalities bounding the ridges of CPMR. These maps provide overview of species distribution and assessment and analysis in terms of biodiversity importance of the area. Local governments concerned were guided and eventually utilized it as basis to formulate management plans in protecting and sustaining the globally significant species found in the CPMR.

Waste of biodiversity in the fine-mesh fixed filter net (tangab) fishery in Iloilo Strait

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Numerous large fixed filter nets (tangab) have operated for decades in Iloilo Strait (which is flooded by the Sulu Sea) during the full moon and new moon periods of the amihan season from October to May. Tangab nets catch everything carried by the currents, from sea surface to sea bed—numerous species of fishes, crustaceans, mollusks, other invertebrates, and even whale sharks, dugongs, and sea turtles. The 400 tangab nets in operation in 2007–2008 removed about 2,000–3,000 mt of marine animals from Iloilo Strait. Some days the tangab would catch large schools of the larval anchovy *Stolephorus* spp. or the sergestid shrimps *Acetes* spp. that have high market value (P100–200/kg). A small amount of the tangab catch is high-value shrimps, mantis shrimps, crabs, squids, and cuttlefishes (P100–300/kg). A much larger proportion of the catch is ‘trash fish’ or ‘bycatch’ of very low market value (P1–5/kg). With the 1–3 mm fine mesh at the cod end, tangab nets catch enormous numbers of larvae, juveniles, or small adults of various species. After being picked fresh for edible species and sizes, the trash fish are sundried and sorted for human consumption, fish meal, or livestock feed. Still the tangab landing sites are littered with huge numbers of dead puffers, eel leptocephali, lobster phyllosomas, megalopas, small crabs, polychaetes, and the young of commercial fishes. The harvest and wanton waste of small animals by any fishery must be markedly reduced. The existing laws against fine-mesh nets must be enforced.

Stele and stomatal features of some *Selaginella* : its significance in systematics

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The Philippines is known to be rich in plant diversity which includes the spikemoss *Selaginella* of the family Selaginellaceae. Taxonomically, the leaves are primarily used in *Selaginella* identification, however, this method is difficult. Based on the literatures, stele anatomy and stomatal morphology can be used for species characterization of which Philippine species of *Selaginella* is understudied, hence, this endeavour. The study aimed to identify the type of stele and stomatal structures of some *Selaginella* species. Eight species of Philippine *Selaginella* were examined: *Selaginella alligans*, *S. cupressina*, *S. delicatula*, *S. doederleinii*, *S. involvens*, *S. magnifica*, *S. ornata* and *S. usterii*. Very thin cross-sections of the stem were obtained by free-hand method, stained and mounted in slide. Epidermal impressions were prepared for stomatal examination. Both stem cross-sections and leaf impressions were examined with light microscopy. Results of the study showed three types of stem stele as exhibited by the eight species studied, namely, monostele, trilete and polystele. Of the eight species of *Selaginella*, four have monostelic type of stele, namely, *S. alligans*, *S. doederleinii*, *S. involvens* and *S. magnifica*. *S. cupressina*, *S. ornata* and *S. delicatula*, *S. usterii* have trilete and polystelic types, respectively. In terms of stomatal types, five species have actinocytic type, namely, *S. cupressina*, *S. delicatula*, *S. magnifica*, *S. ornata* and *S. usterii*, while *S. alligans*, *S. doederleinii* and *S. involvens* exhibit anomocytic stomatal configuration. Based on the stele type and stomatal configuration of *Selaginella*, anatomical characteristics exhibited by the selected species could be of taxonomic significance.

Diet composition and prevalence of selected feline pathogens of Palawan leopard cat (*Prionailurus bengalensis heaneyi* Groves, 1997) in Barangay Cabigaan, Municipality of Aborlan, Palawan Island, Philippines

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The status of Palawan leopard cat (*Prionailurus bengalensis heaneyi* Groves, 1997), a subspecies endemic to Palawan Island of the Philippines, has not yet been assessed and may fall under a threatened category due to its restricted geographical range and few sighting records which merits researches regarding its biology and ecology. This is a pioneer study on the diet and pathogens of *P. b. heaneyi* and the objectives are to determine the diet composition through analysis of hair present in scats, to compute for the prevalence of each pathogen present in the species, and to investigate possible pathogen transmission from domestic cats (*Felis catus* Linnaeus, 1758) to Palawan leopard cats and vice-versa. Twenty box-caged live traps placed one kilometer apart and left overnight for five consecutive nights yielded one capture and a blood sample was collected for the serological detection of pathogens using antibody and antigen test kits. A fecal sample was also collected and formalin-ether concentration technique was employed for the coprological detection of pathogens. Cuticular and medullary patterns of hair found from the fecal sample were observed for prey identification. Preliminary data reveals that the captured individual is highly positive for *Toxoplasma gondii* and *Chlamydophila felis* but negative for *Giardia duodenalis*, Feline Leukemia Virus (FeLV), Feline Immunodeficiency Virus (FIV), and Feline Infectious Peritonitis Virus (FIPV). Identification of prey and parasites of *P. b. heaneyi* is still ongoing as well as trapping and sampling which will end on January 2014.

Biodiversity of the phytoplankton community of Lake Mohicap (San Pablo City, Laguna, Philippines)

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The phytoplankton community structure of Lake Mohicap (San Buenaventura, San Pablo City, Laguna, Philippines) was evaluated in terms of species density, composition and succession, and their relation to the different physico-chemical characteristics of the lake. Collections of integrated water samples were carried out twice a month from April 2013 to January 2014 for qualitative and quantitative analyses of phytoplankton species. A total of 59 taxa belonging to five different algal classes were observed and recorded. Classes of Bacillariophyceae, Chlorophyceae and Cyanophyceae were the most dominant species in the entire sampling period. Bacillariophyceae was the most prevalent group during the dry season while Chlorophyceae and Cyanophyceae in the wet season. Phytoplankton density and composition were high in the dry season and showed significant relationships with nitrates, phosphates, temperature, pH and dissolved oxygen, while this was negatively correlated with transparency. Water parameters such as pH and dissolved oxygen were in their desired range while temperature showed a relatively stable condition.

Featuring educational puppetry in wildlife conservation communication campaigns for school children in northern Philippines: The ISU – NGO Crusade

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Over the past 10 years, educational puppetry has survived extinction in the Cagayan Valley Region by being featured in an intensive Communication Education and Public Awareness (CEPA) Campaign on wildlife conservation and environmental protection. As a form of folk medium, the staging of puppet shows have diminished over the years due to its cost-intensive production requirements and the lack of trained educators or organized puppetry groups to sustain its continued use as an educational medium. However, in the Isabela State University where the Bachelor of Science in Development Communication program is being offered, students are trained in educational puppetry because its potentials as a highly interesting and attention getting medium is greatly recognized. Its use in actual wildlife and environmental conservation projects was applied when ISU established a memorandum of understanding with the Mabuwaya Foundation which is running the Crocodile Rehabilitation, Observance and Conservation (CROC) Project, and with the ORIS Project for the Isabela Oriole conservation to provide assistance in the CEPA strategy of these organizations. This paper therefore presents the contributions of educational puppetry in the 10-year crusade to educate school children and their parents in conserving the Philippine crocodile (*Crocodylus mindorensis*) and lately, the Isabela Oriole (*Oriolus isabellae*) and its natural habitat. It will feature the integration of educational puppetry in a multi-media approach to wildlife conservation information campaign and will provide insights into how other conservation projects in the country can tie-up with other academic institutions to explore the potentials of puppetry in conservation education.

Identification of ecto- and endoparasites in *Glossogobius giuris* (Hamilton, 1822) from Laguna de Bay

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Thirty *Glossogobius giuris* (biyang puti or white goby) from each site were obtained from Talim Island, Sta. Cruz, Laguna, and Binangonan, Rizal. The samples were examined for presence of parasites in the gills and gastrointestinal tract of the fish. Twenty-four (80.0%) samples from Talim Island, thirty (100%) from Sta. Cruz, Laguna, and eighteen (60.0%) from Binangonan, Rizal were positive for gill parasites. Fourteen (46.7%), twenty-one (66.7%) and eleven (36.7%) samples were positive for gastrointestinal parasites respectively. No correlation was seen between the morphometric factors and the presence of parasites. The gill parasites were identified as Protozoans and *Dactylogyrus* sp. This study represents the first recorded incidence of *Dactylogyrus* sp. infecting *G. giuris* in the Philippines. Only one kind of parasite was isolated from the gastrointestinal tract and was identified as *Neochasmus microvatus*.

Vegetation analysis of the island towns of Laoang and San Antonio, Northern Samar, Philippines

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This study aimed to identify, compare, and make an inventory of the terrestrial macroflora in the island towns of Laoang and San Antonio, Northern Samar; determine their local names; identify their abundance and distribution; and determine their economic importance. The study was conducted during March to April 2013 in selected barangays of Laoang, namely: Brgys. Calomotan, Aguadahan, and Onay, as well as in selected barangays of San Antonio, namely: Brgys. Vinisitahan, Burabod, Manraya, and Dalupirit. For studying terrestrial macroflora, three sites of each barangay were established using the Line Intercept Transect (LIT), at intervals of 100m each. There were 151 species of terrestrial macroflora found in the island town of Laoang, and 95 species in San Antonio. The island of Laoang has a more diverse macroflora because it is closer to the mainland of Northern Samar. Most of the macroflora were used as food, kitchen utensils, decorations, construction materials, for medicinal purposes, making furniture, boats for fishing, and a few for clothing and handicrafts.

Annotated list of odonata from Mainit Hot Spring Protected Landscape, Compostela Valley, Mindanao Island, Philippines

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Within the framework of the 'Rapid Biodiversity Survey of Mainit Hot Spring Protected Landscape' conducted by the Research and Development Centre of Assumption College of Nabunturan, an annotated list of Odonata was compiled, representing 41 species in 25 genera and 12 families from seven sites surveyed from December 2011 to February 2012. These records represent the baseline data for Mainit Hot Spring Protected Landscape and even for Compostela Valley Province. One species is potentially new to science; more than half of the records are forest dwelling endemics.

Natural beach forest species inventory and mapping in Barangay Poblacion, Lingayen, Pangasinan

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A floristic survey was conducted on the 7.5 sqkm area of Barangay Poblacion, Lingayen, Pangasinan in December 2012 to May 2013. Forty six different species were documented and described. Seven natural beach forest species were identified in the area, namely, *Barringtonia asiatica* Linn., *Casuarina equisetifolia* Linn., *Cocos nucifera*, *Ipomoea pes-caprae* Linn. R. Brown, *Morinda citrifolia* Linn., *Spinifex littoreus* (Burm. F.) Merr., and *Terminalia catappa* Linn. Three tree species, which included *Barringtonia asiatica* Linn., *Casuarina equisetifolia* Linn. and *Terminalia catappa* Linn., were counted, mapped and their individual diameters at breast height (dbh) were measured. The trees were categorized based on dbh as small (<5cm), medium (5.1-30cm) and large (>30 cm). Thirty six (36) individuals for *Barringtonia asiatica* Linn., 62 for *Casuarina equisetifolia* Linn. and 189 for *Terminalia catappa* Linn. were recorded in the study site. The data collection is an initial attempt to establish a database that can provide valuable information on species listing, abundance and dbh of ecologically important tree species. These baseline data can be used for monitoring the survival and growth rates of beach forest trees that are being used for reforestation purposes by the community in the area. Natural beach forest trees near coastal zones are recognized for their ecological importance, particularly because they provide protection during typhoons and strong winds. Thus, this database is also intended to form the basis for formulating policies not only for beach forest conservation but also for climate change mitigation.

Species richness of Lauraceae in Mt. Musuan and Mt. Kitanglad

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The members of the family Lauraceae are composed mostly of trees and shrubs. It contains species that are nearly all species have economic importance. They are mostly are aromatic evergreen plant used as medicinal, food (cinnamon and avocado), spices, medicinal extracts, essential oils, camphor and other products. The family has 3,500 species in 50 genera of Lauraceae. In Kew herbarium less than 3,500 species in 61 genera worldwide. The in the Philippines, the family Lauraceae has 130 species in 16 genera was to determine the number of species of Lauraceae in the two mountains in Mindanao through transect walk field inventory showed that Mt. Musuan has 9 species under 6 genera. Of these 8 species are economically important and 1 is vulnerable. On the other hand, Mt. Kitanglad revealed 7 species in 5 genera. Of these, 6 were economically important species and 1 is assessed as (OTS) after Other Threatened species. Since the inventory was done in just a short time there is a need to thoroughly explore the two mountains to obtain accurate number of species of the family richness of Lauraceae.

Mangrove forests of Davao City and Island Garden City of Samal

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Philippine mangrove forests, home of many faunal species, have declined rapidly. The study was conducted to provide maps of the remaining mangrove forests in Matina Aplaya, Davao City and Adecor, Island Garden City of Samal. Species richness, basal area, relative density, relative frequency, and species diversity were determined in the study. Matina Aplaya showed forest patches, residential development and basal area of .001314 ha². Only *Sonneratia alba*, without any seedling and sapling, was observed. Since only one species was recorded, relative density, relative frequency and relative dominance was the same from landward to seaward. Furthermore, the said forest had zero species diversity. Adecor showed mangrove forest with minimal human disturbance and basal area of .000506 ha². *Sonneratia alba*, *Sonneratia ovata* and *Rhizophora apiculata* were recorded. *S. alba* relative density, relative frequency and relative dominance were highest in intermediate zone of the forest. Adecor species diversity was .26. Thus, Adecor, Samal Island mangrove forest had greater species diversity than Matina Aplaya, Davao City mangrove forest.

Genetic diversity of wild abaca (*Musa textilis* Nee) species from the germplasm collection of the National Abaca Research Center, Visca, Baybay City, Leyte

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Forty five wild abaca accessions from the National Abaca Research Center at the Visayas State University were analyzed for phenotypic diversity based on qualitative and quantitative morphological characters by cluster analysis and diversity index (H'). Cluster analysis revealed one major cluster at five Euclidean for qualitative characters consisting of two accessions. The remaining accessions were grouped as a cluster with less resemblance to each other. In terms of quantitative characters, there was one major cluster consisting of 41 accessions and the remaining accessions as a cluster due to less similarity. Diversity (H') indices revealed characters of low diversity namely; absence of pseudo stem waxiness, green petiole margin, right-handed lamina base, presence of anthocyanin pigment at the pseudostem base, purple blossom, female basal flower, pendulous male axis, presence of male flower, yellow compound tepal, dehiscent neuter flower, prominent male bract scar, glabrous fruit skin, dull fruit, yellow ripen fruit, no fruit cracking, pale orange fruit flesh, sub-globose seed, top plant diameter, number of sterile bracts, fruit pedicel length and number of locules. There is a relatively high degree of variability or genetic diversity among the wild abaca accessions at the NARC germplasm.

Assessment of macro-invertebrate gleaning in Lagonoy Gulf: Albay Side

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An assessment of the fishery for macro-invertebrates gleaning in Lagonoy Gulf was undertaken to determine the status and contribution to food security, income and the fisheries. Rapid Resource Assessment (RRA) was used and supplemented by key informant's interview and actual gleaning data. Finding reveals gleaning as traditional practice of women with their siblings. It is a subsistence fishing activity in shallow reef flats, mud flats, sand and rocky areas, sea grass including mangrove areas. Species caught include shellfishes, crustaceans and other invertebrates. Gleaning employs fishing methods that require use of senses and skilful utilization of fisheries knowledge and simple tools. It directly and indirectly contributes to the total fisheries. At least 296 tons of macro-invertebrates valued PhP 5,920,128.00 at a selling price of PhP 20.00/kg is contributed by gleaning to the total fishery. At the household level, they are either in the form of additional income estimated roughly at PhP 20,556/gleaner annually or the same amount as savings when used for food. Ecologically, since invertebrates are lower down the food chain, the practice may result "ecosystem over fishing". In-depth studies along biodiversity conservation; management; health and safety hazards are recommended.

Biodiversity of mangroves in selected coastal areas of Cavite

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The study entitled “Biodiversity of Mangroves in Selected Coastal Areas of Cavite” was documented and assessed using the following parameters: (1) Physio-geographical feature of the mangrove areas in selected coastal areas of Cavite, (2) Community structure in terms of species density, species dominance, species frequency, importance value, and species biodiversity, and (3) Perception of people about mangrove trees found in their locality. Four coastal areas of Cavite were selected as sample sites for the study namely; Cavite City, Kawit, Noveleta, and Rosario. Geographical Information System (GIS) of the mangrove ecosystem of the four sample sites was generated to assess the areas covered by the mangrove ecosystem. Physio-geographical features of the mangrove areas were photo documented that includes; (1) over view photograph of the mangrove ecosystem, (2) ecological disturbances present, (3) common livelihood of residence, (4) rehabilitation actions undertaken by each municipality, (5) fauna and mangrove species encountered. The community structure of the mangrove areas of the selected sites was determined using the plot-quadrat method. For each sites three (3) 10m x 10m plot with a distance of 50m from each other was established perpendicular from the shoreline. Four dominant mangrove species were identified, namely; *Avicennia marina*, *Avicennia alba*, *Sonneratia alba*, and *Rhizophora mucronata*. *Avicennia marina* was the most dominant of the four mangrove species, having a species density of 5675 no./ha, stand basal area (SBA) of 2268.33 m²/ha, species frequency of 1.00, and importance value of 172.1 diverse mangrove ecosystem having a Shannon diversity index (H') of 1.34, species richness (H_{max}) of 1.39 and species evenness (E) of 0.97. Interview method was used to assess the perception of people living near mangrove areas about their ideas on mangrove trees as well as the actions of the local officials in conserving the provincial mangrove ecosystem.

Results of avifaunal survey in Real-Infanta Watershed Forest Reserve towards a critical habitat status

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Real-Infanta Watershed Forest Reserve (RIWFR) is one of the least studied watersheds in Region 4A. The watershed covers 384has of forest shared by the municipality of Infanta and Real. In partnership with CENRO Real and the Municipal Governments of Infanta and Real, the team surveyed the avifaunal diversity of RIWFR. Observation posts were established in vantage points inside the watershed to increase the area of visibility and sampling effort. The site was surveyed for nine days where 53 species were identified during the sampling period and six more species were identified outside of the sampling period. There were 26 endemics, 29 residents, and 4 migratory species observed through-out the study. The most notable species found in the watershed is the Philippine Hawk-Eagle, a Vulnerable species under the IUCN red list. The area also houses a population of the Near Threatened Rufous Hornbill. The site is threatened by ongoing illegal logging operations in areas inside and at the edge of the watershed, which was observed during the survey. We recommend that this area be given a Critical Habitat status and be declared as an Important Bird Area, since it holds a globally threatened species and numerous endemic birds.

Diversity and patterns of occurrence of bats in Adams, Ilocos Norte, Philippines

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Bat diversity in the Philippines is considered as one of the highest in Asia but the ecology of the species remains to be poorly known. With the increasing rate of habitat degradation in the country, the need to know how bats are responding to disturbances becomes even more pressing. A survey of bats within the community of Adams, Ilocos Norte and the surrounding forest was conducted to determine the diversity and patterns of occurrence and abundance of the species recorded using mist nets. Nets were placed around fish ponds, on forest edges, along trails and across streams. For four nights, a total of 43 individuals, representing eight species were documented, most of which are fruit bats. Some species are first reported from the area, including *Cynopterus brachyotis*, *Eonycteris robusta*, *Macroglossus minimus* and *Rhinolophus subrufus*. More individuals (27/43), but relatively lesser number of species, were recorded from the residential area compared to the forested area. This affirms previous observations that bats are more diverse in less disturbed habitats. *Scotophilus kuhlii*, were only observed in the community, confirming the close association of the species to humans. For *C. brachyotis* and *P. jabori*, it appears that they are generally more tolerant to disturbances than the rest of the other species. Interestingly, the two species of *Eonycteris spelea* and *E. robusta* shows an opposite tendency, with the former tends tolerate disturbance and less commonly documented *E. robusta*, tends to be restricted in forest habitats. Other studies must be done to further investigate the tendencies observed here.

Taxonomic studies on four Cladoceran families in Philippine inland waters with an updated key to Philippine Cladocera

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The sensitivity of zooplankton to the overall conditions of their habitats has made them good bio-indicators. Thus, proper determination of their taxonomy and distribution are very important in the precise evaluation of the status of their aquatic habitats. Sustainable aquaculture needs a healthy and adequate population of zooplankton as they serve as food for most larval stages of important fish species. The research sought to update the current taxonomy and diversity of freshwater zooplankton from four families: Bosminidae (limnetic), Moinidae (limnetic), Sididae (mostly limnetic) and Chydoridae (littoral) across the archipelago. Plankton were collected from lakes, water impoundments, dams (53), rivers (17), temporary pools and other freshwater bodies (16) throughout the country. Two species from two genera were found for both Moinidae and Bosminidae. Five species coming from two genera were observed for Sididae and six species for Chydoridae from six genera. Comparisons with previous studies on Philippine cladocera revealed several discrepancies, which may be due to a more comprehensive examination of morphological characteristics of the specimens during the course of this study. Though no new species were discovered, the increased sampling effort in more localities for this study led to several new species and / locality records which is an enormous contribution to current efforts to better understand plankton zoogeography in the tropics. An updated taxonomic key for Philippine Cladocera is likewise provided to help in identifying cladocerans from Philippine inland waters.

A gap analysis of wildfowl demographic research: meeting conservation priorities?

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The conservation of wildfowl presents a challenge, due to the extensive loss of wetland habitats. Successful wildfowl management is underpinned by an understanding of the mechanistic link between a changing environment and the changing status of populations. The examination of research biases can be a useful method to address whether conservation priorities are being met. This type of research may provide a system for evaluating the importance of new demographic information. The aim of the presentation is to discuss the geographic and taxonomic biases in demographic research output; and the implications of the research knowledge for threatened wildfowl taxa with reference to the Philippine Duck. Over 2000 published papers have been collated and the demographic information extracted. Strong taxonomic, geographic and demographic biases are apparent in published wildfowl demographic research, with consequent substantial knowledge gaps, despite wildfowl being one of the better-studied groups. North America and Europe contributed to more than 80% of the research output. Over 80% of species had at least one demographic research output. However, a high proportion of wildfowl species had very little information: over 50% of taxa had 10 or fewer demographic outputs. It is apparent that there are gaps in wildfowl demographic research. Conservation research must be directed towards threatened taxa with little research, for example the Philippine Duck. Demographic information is vital in order to identify management strategies for species of conservation concern.

Initial findings on Northern Sierra Madre forest monitor lizard *Varanus bitatawa* distribution and ecology

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The northern Sierra Madre forest monitor lizard *Varanus bitatawa* was described only in 2010. This fruit-eating monitor lizard seems to be limited in distribution to the Northern Sierra Madre. Very little is known about its distribution, population size and ecology. Baseline data on distribution, population size and threats to this species were collected by interviewing hunters in Isabela Province in June – July 2012. *Varanus bitatawa* is a widespread species in lowland forest, though hunting pressure is high. Baseline data on the ecology of *Varanus bitatawa* was collected during June to August 2013 in two study sites in Isabela and Cagayan Province. Lizards were caught and fitted with radio-telemetry and spool and line devices, subsequent trail threads were examined and camera traps utilized to establish patterns of tree use and activity ranges. Faecal samples were examined to determine diet. Habitat was characterized through PCQM surveys and line distance sampling. Dietary items identified included fruits belonging to *Microcosstylocarpa*, *Canariumhirsutum* and *Pandanceae* alongside unidentified species of snails and insects. Lizards were caught in lowland Dipterocarp forest dominated by *Shorea*. The nearest permanent human settlement was approximately 1km from capture. Activity areas ranged from 0.05ha to 3.16ha with lizards spending a mean of 3.25 days in a single tree.

Comparative morphological and anatomical studies of three *Hoya* species from Mount Hamiguitan, Davao Oriental

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Gross morphological and anatomical features of three *Hoya* species viz. *Hoya bilobata*, *Hoya soligamiana* and *Hoya crassicaulis* were described and compared. Morphologically, *H. bilobata* has glabrous ovate to lanceolate leaves; flowers with fused purplish to pink petals; reddish to pink inner coronal lobe; yellowish outer coronal lobe and green to yellowish green fused sepals. *H. soligamiana* on the contrary has glabrous lanceolate plinerved leaves. It has whitish to creamy white petals, purplish to pink inner and outer coronal lobe and whitish to pink fused sepals. In *H. crassicaulis*, leaves were coriaceous lance-ovate; flowers has fused whitish to yellowish petals; yellow inner coronal lobe; reddish to orange outer coronal lobe and fused sepals. Anatomically, the root and stem of the three *Hoya* species revealed the presence of periderm, complex cortex, vascular cambium, and endarch xylem differentiation. The adventitious root and leaf have amphicribral vascular bundle while the stem has bicollateral vascular bundle. Their root is haplostelic while their stem stele is amphiphloic siphonostele. The pith is parenchymatous. The macerated stem revealed the presence of spiral tracheid in *H. bilobata* while in *H. soligamiana* and *Hoya crassicaulis* have both spiral and annular tracheids. The leaf epidermis is uniseriate. Mesophyll region is differentiated into palisade and spongy layer. Cleared leaf revealed a netted venation pattern. *H. bilobata* and *H. crassicaulis* have both cyclocytic stomata though in *H. crassicaulis* its sunken while *H. soligamiana* has actinocytic stomata. Morpho-anatomical information presented evidently provides additional taxonomic value for identifying and classifying the three *Hoya* species.

Ectoparasitic infestation of quarantined animals in a wildlife rescue center

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This study aims to conduct an ectoparasite survey among those quarantined animals in a wildlife rescue center and determine the distribution of the ectoparasites in their hosts. Method: Acetate strip technique and manual extraction methods were employed to collect the ectoparasites from the animals brought in the wildlife rescue center. Results: About 53% of the quarantined animals in the wildlife rescue center were positive for ectoparasitic infestation. A total of 344 ectoparasites were recovered from 51 birds and 6 mammals quarantined in the wildlife rescue center. Of the total ectoparasites, 23 are lice and 321 are mites. The ectoparasites obtained from the survey showed that the isolated ectoparasites belong to 11 different taxa. No statistical significant differences were observed on the Shannon Wiener Diversity Indices across all the 8 weeks of collection ($p > 0.05$). Conclusion: Continuous monitoring of the presence of ectoparasites among the quarantined animals is recommended.

Bat species in Kinayao Mining Area, Sultan Kudarat, Philippines

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Bats are among the species around the world at risk brought by various ecological threats and disturbance. Mining is considered as one of culprit in habitat modification in many areas. This study was conducted to collect preliminary data on the species of bats in small scale gold mining in Brgy. Kinayao, Sultan Kudarat. Two sets of sampling was employed, during active mining and non-active mining activity. During active mining, dynamite blasting are actively on-going and large mining machineries were present. The study have resulted in identifying a total of eight bat species namely: *Cynopterus brachyotis*, *Eonycteris spelaea*, *Haplonycteris fischeri*, *Hipposideros ater*, *Macroglossus minimus*, *Megaerops wetmorei*, *Ptenochirus jagori* and *Rousettus amplexicaudatus* with three endemics. Species abundance have shown that there are difference during active and non-active mining activity. Lower species abundance was noted in the active blasting activity in the site. This agrees with other studies that bat species tend to react with high environmental noise. In bigger picture, bat diversity in the area affected by mining is very low. Moreover, this study indicates that mining and its associated activities are vital in the population conservation of bat species.

Bat Cave Prioritization Index (BCPI): a scheme in prioritizing bat cave for conservation in the Philippines

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Identification of key habitat types for wildlife is an essential step to plan and promote strategies for long-term conservation. In the Philippines, caves is one of the habitats that harbor numbers of ecologically important species that needs a serious attention for protection. Caves are important habitat for bats, it is estimated that there are about 78 species of bats in the archipelago and over 30 of them depends on caves for their life history and survival. The Bat Cave Prioritization Index (BCPI= PbPg) attempts to create a standard index for evaluating bat caves for conservation based on two limitations, the biological (Pb) and geophysical (Pg) potential of caves. The biological potential is represented by cave bat's species attributes such as population, richness, endemicity, conservation status, species-site commonness and geophysical potential is represented by the bat cave's physical and geographical features (accessibility to cave, cave openings, effort of exploration, tourism potential, presence and intensity of cave internal and external disturbances). Furthermore, the use of BCPI in bat cave assessment will be valuable in cave conservation with concern to bats and cave features.

Rapid assessment of bird and bat species in riparian habitats along the Pinacanauan de Tuguegarao, Penablanca Cagayan

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Riparian habitat serves as secure travel corridors for both birds and bats, especially for highly fragmented habitat brought by human induced activities such as slash and burn farming practices and other unsustainable upland farming activities. Very little is known about the biodiversity in the riparian region along the Pinacanauan de Tuguegarao in the municipality of Peñablanca, Cagayan Province. From April to September 2013, we conducted a rapid assessment of bird and bat species in the riparian habitat along the Pinacanauan de Tuguegarao River within the Penablanca Protected Landscape and Seascape (PPLS). Mist netting, transect walk survey, point counts and opportunistic observation were employed to record the birds and bats present in the area, provide baseline ecological information and to identify possible key areas of conservation concern. All netted faunal species were subjected to morphometrics and proper photo-documentation. Our team recorded a total of 72 bird species of which 27 are endemic to the Philippines (37.5%) and six (6) bat species of which five are megachiropterans or fruit bats (33% endemism). In terms of conservation importance, we forward two significant observations. First, the near-threatened Philippine Dawn bat *Eonycteris robusta* (IUCN, 2013) was breeding during the survey months. Second, the nest and nesting behavior of the Luzon-endemic bird Red-crested Malkoha *Phaenicophaeus superciliosus* of the race *cagayanensis* was characterized and documented. It was observed that the bird was showing a brooding behavior, a deviation from the earlier documented parasitic behavior in most species of the family Cuculidae. Results indicate that riparian habitat along the Pinacanauan de Tuguegarao River is a functional and important area for endemic birds and bats.

Documenting fish species in selected major Philippine lakes

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Information on fish fauna in selected major Philippine lakes is assembled using FishBase, a global public good developed as a decision-support system for conservation and management of aquatic ecosystems. Status and importance as well as key biological information are provided for each species. Information gaps are identified to highlight priority areas for research and development as well as for use in assessment of species status (e.g. red list, sustainability, etc.). A conceptual framework is proposed to address these gaps.

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Gastrointestinal Helminth fauna of bats in Puting Bato, Polillo

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Parasitic fauna of Philippine wildlife, especially bats, are usually less studied if not ignored at all. Parasites are important components of the ecosystem in terms of increasing biodiversity of the area as well as in the ecology and conservation of their host species. In connection with this, a survey was done on the gastrointestinal parasite fauna of bats in Puting Bato, Polillo in the province of Quezon. This was done to increase the information on the bat-parasite interactions as well as increasing knowledge on biodiversity of the area. A total of 69 bats, composed of 13 species from 7 genera, were caught and examined. From these, 7 (10.14%) individuals, belonging to *Hipposideros*, *Ptenochirus*, and *Rousettus*, were found to be infected with gastrointestinal parasites. Parasites that were collected included 2 species of cestodes belonging to the genus *Vampirolepis* and 2 nematodes that are yet to be identified. Cestodes were observed in 5 (7.25%) individuals belonging to each of the genera stated above, while nematodes were only observed in 2 (2.90%) individuals belonging to genus *Hipposiderus*. Further studies on bat parasites should be done as to increase information on the parasites of bats. Such studies would also increase the sample size of infected hosts to further correlate parasite prevalence and intensity with different characteristics of the host such as weight, sex and age. Studies on the parasite fauna of bats does not only add to the present information on their biology and ecology but can also be implicated in their conservation and protection.

Challenges and issues facing natural history collections and museums

Facilitators: *Lawrence M. Liao, Hiroshima University and Luisito T. Evangelista, National Museum of the Philippines*

In the Philippines, natural history collections and museums specialized for showcasing biodiversity are few and often underappreciated. In a biologically diverse country such as the Philippines, these institutions play an indispensable role for documenting and promoting greater public awareness of such diversity as part of the Filipino natural heritage. Clearly there is a need to encourage further guided documentation and increasing biodiversity education in all levels of society to achieve these goals.

Changing socio-cultural, economic and political climates have necessitated some realignment of institutional approaches and goals while keeping track of their original mandate. Some institutions have to re-invent themselves amid changing and challenging times in order to survive. Many have experienced dwindling fiscal support from government and the private sector. The practice of natural history museology and curatorship also faces severe threats from the looming paucity of trained taxonomists owing to the retirement of curatorial personnel and the lack of interest among students in pursuing careers in taxonomy and systematics.

This mini-symposium will attempt to address crucial issues ranging from shifting traditional paradigms into those thought to be more responsive to societal needs, examining the relationships between museums and their benefactors as well as their target clientele, presenting some examples of best practices and proposing measures to reverse the seemingly lethargic trend seen in the Philippine setting.

Reinventing the wheel of environmental education

Facilitators: *Henry G. Calilung, Marina Nicole G. Salvador, Aira Trisha G. Dy Guaso and Ria Rochelle M. Garcia, Holistic Education and Development Center*

Very few high school Filipinos go into environmental science related courses in college. Most end up pursuing the usual (business/engineering/medicine/architecture) BA or BS degrees. As a result, there are very few graduate students doing research on and for the Philippine environment. I believe that the greatest factor contributing to this is lack of exposure in high school. High school (Grades 7 to 12 in the new K12 scheme) is where the career path of a student is most often determined (or at least launched in a general direction if not yet fully defined) so it is crucial to immerse the students in environmental science during these “career-pathing” years. Unfortunately, most high schools teach ecology out of a textbook with very little field work activities. The traditional laboratory activity is reserved for the traditional sciences- biology, chemistry and physics. In fact, lessons on food webs, ecosystems, nutrient cycles, wildlife conservation and what not are often delivered indoors which, no matter how dynamically delivered by the most upbeat teacher, will always be a far cry from actually going out into the field. As such, this workshop is actually a challenge for high school teachers to start teaching “hard-core” environmental science.

Would the proposed new standards for identification of key biodiversity areas be fit for purpose in the Philippines?

Facilitators: *Thomas Brooks, International Union for Conservation of Nature (IUCN). Shiela Vergara, ASEAN Center for Biodiversity and Nina R. Ingle, Wildlife Conservation Society of the Philippines*

The IUCN World Commission on Protected Areas and Species Survival Commission have been convening a process to consolidate the standards for the identification of Key Biodiversity Areas, as sites contributing significantly to the persistence of biodiversity. These build from existing approaches to identify important sites (e.g., Important Bird Areas) as well as early application of KBA criteria (e.g., in the Philippines). To date, criteria have triggered site identification based on threshold presence of threatened species, restricted-range species, biome-restricted assemblages, and congregations. The current process has proposed complementing these with criteria for the presence of threatened and restricted-range ecosystems, outstanding ecological integrity, and outstanding evolutionary and ecological process. How might these criteria be applicable in the Philippines? After an introductory presentation, the workshop will subdivide into breakout groups to scope examples of cases where the proposed new criteria might trigger KBA identification in the Philippines. The workshop's final session will comprise plenary reporting back and discussion, with the outcomes to be fed into the review process for the new standard over 2014, in advance of its launch at the World Parks Congress in November.

Local communities as partners in biodiversity research and conservation

Myrissa Lepiten-Tabao, Visayas Regional Unit, Foundation for the Philippines Environment and Tanya Conlu, Non-Timber Forest Products – Exchange Programme

It is a common practice of many biodiversity researchers to focus only on data gathering. There is usually very limited interaction with the communities they come into contact with, save for the need to hire locals as porters, field hand or guides. More often than not in these situations, the local people, most especially indigenous communities, may feel exploited or resent the intrusion into their community.

However, local communities and peoples are a rich source of information if only researchers recognize this and interact with them in a judicious way. This workshop is meant for new or junior researchers. The sharing and discussions are intended to provide ethical considerations in working with local communities and to value them as partners in the field research and conservation activity. The topics that will be discussed will include: securing the Free and Prior Informed Consent (FPIC), bioprospecting, harnessing indigenous knowledge, skills & practices, respecting local customs, and giving back to the community.

At the end of the session, the participants will have a better understanding of how to work with local communities and of respecting local knowledge and culture, thereby provide mutual benefit for the researcher and the community.

The workshop will be led by people with experience both in conducting field research and in working with local communities in community-based conservation projects. The local perspective will be provided by a community leader who will share his own experiences in working with field researchers and conservationists.

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23rd Philippine Biodiversity Symposium Working Committees

Membership of the various committees was drawn from among the membership of the Association of Systematic Biologists of the Philippines [^#], Wildlife Conservation Society of the Philippines [^*] and the University of San Carlos [^*]. Chairs in bold.

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